THE JOURNAL OF GAS LIGHTING
WATER SUPPLY & SANITARY IMPROVEMENT

VOL. LXXI. No. 1817.] LONDON, MARCH 8, 1898. [50TH YEAR. PRICE 6d.

TUBES AND FITTINGS
FOR
GAS, STEAM, WATER,
AND ALL PURPOSES,
ALSO
COILS OF EVERY SIZE AND SHAPE.

Apply to the Original Firm of
JOHN BROTHERTON
LIMITED,
Imperial Tube Works, Monmore Green,
WOLVERHAMPTON.
ESTABLISHED 1861.

Lanemark Coal Co.,
LIMITED.
LANEMARK CANNEL AND GAS COALS.
Quotations and Analysis on Application to
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Shipping Ports: All the principal Scotch Ports.

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Parker's Imperial Black Varnish,
Oxide Paints, Oils, and General Stores, for Gas and Water Works.
WORKS:
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FOR TOWN WATER-WORKS AND OTHER SUPPLIES.
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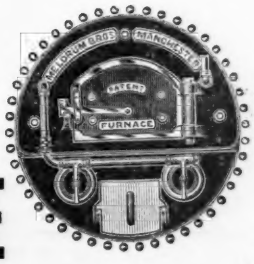
"MELDRUM'S"
PATENT
BREEZE FURNACE



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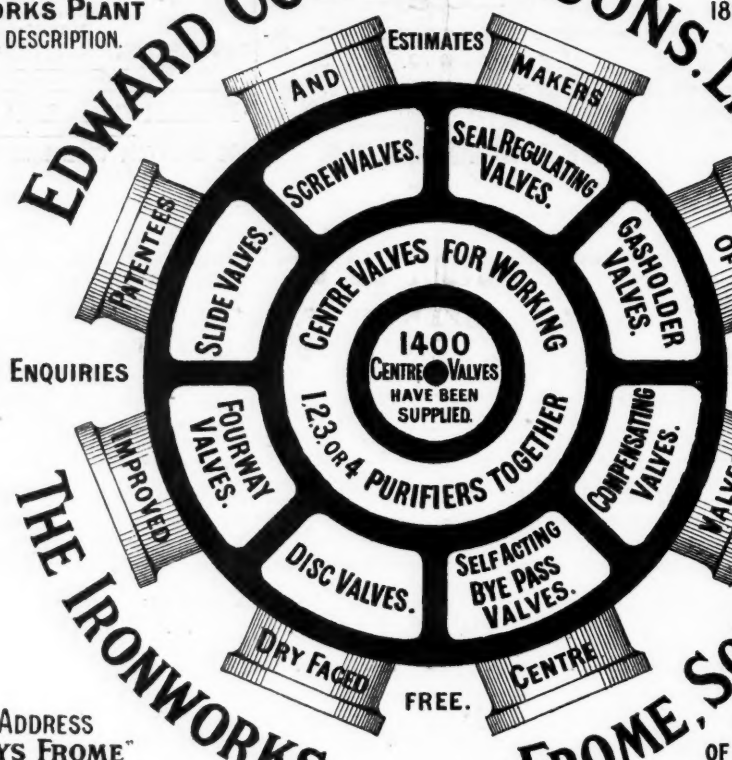

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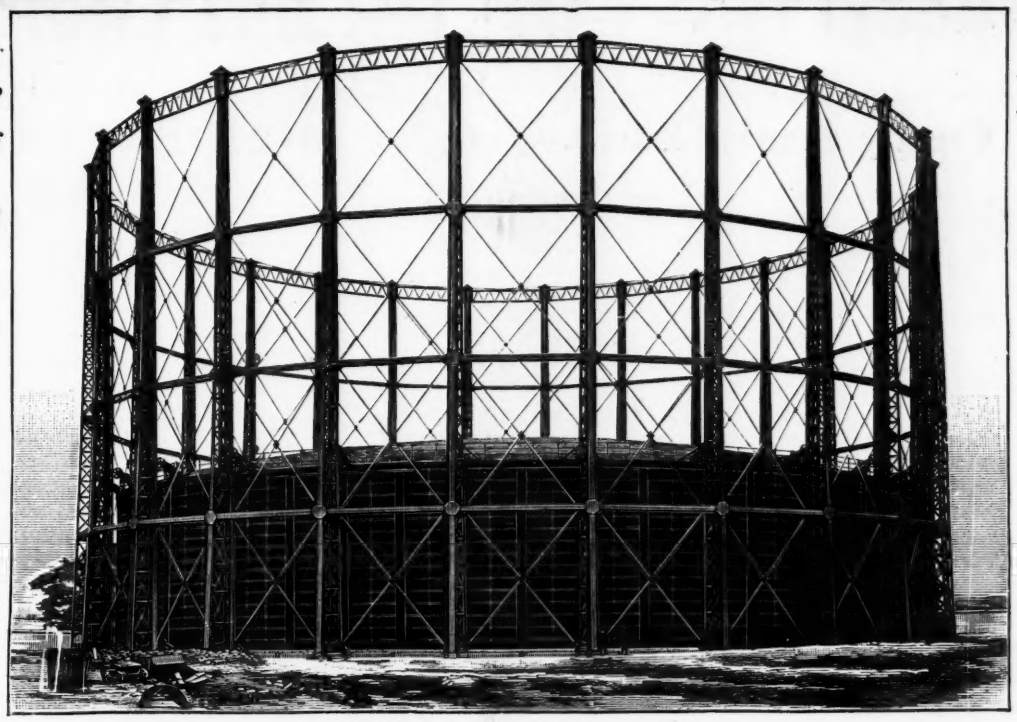

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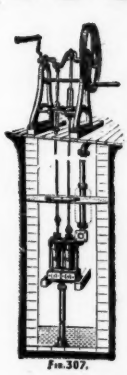

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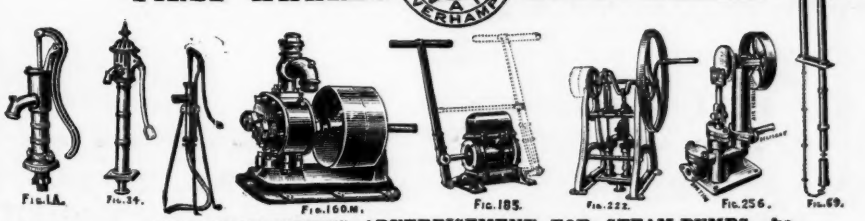

Fig. 307. Fig. 1A. Fig. 34. Fig. 160M. Fig. 185. Fig. 222. Fig. 256. Fig. 69. Fig. 102. Fig. 328.

SEE NEXT WEEK'S ADVERTISEMENT FOR STEAM-PUMPS, &c.

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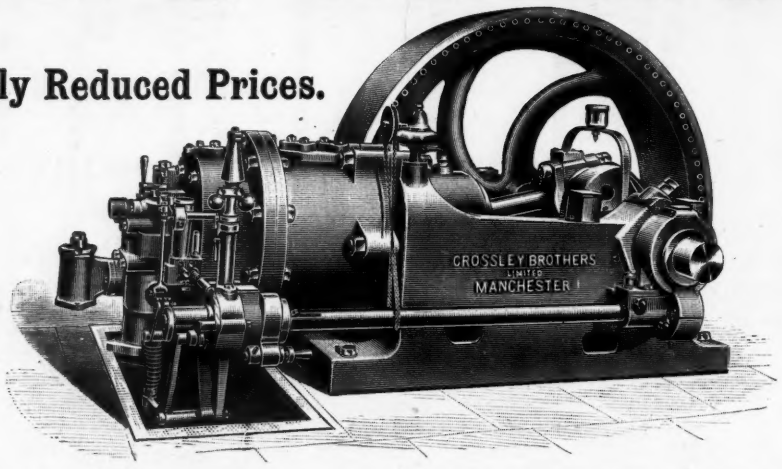
Greatly Reduced Prices.



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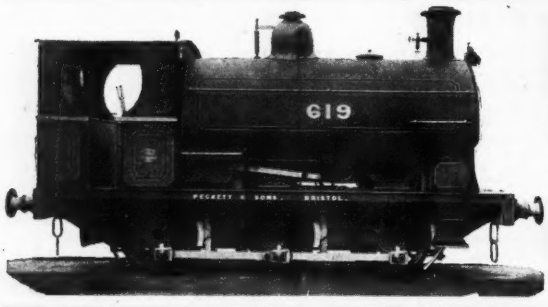

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GASHOLDERS,
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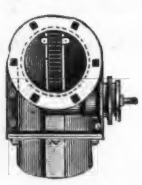

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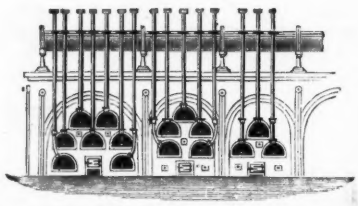

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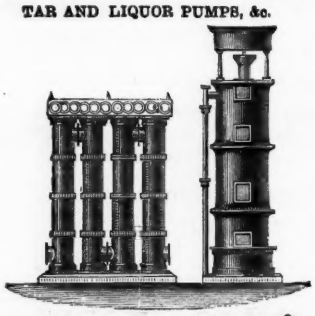
CONDENSERS,
SCRUBBERS, & WASHERS,
TAR AND LIQUOR PUMPS, &c.



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for working Purifiers,
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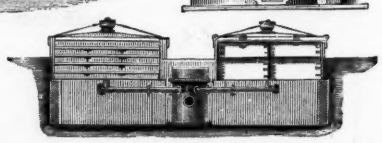

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THE GREATLY REDUCED CONSUMPTION OF GAS

COVERS THE INITIAL COST OF THE BURNER IN LESS THAN SIX MONTHS.

The Ordinary "C" Burner,
PRICE 6/6.

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Prices of other Patterns Reduced Proportionately.

The attention of Gas Managers and Gas Engineers is called to this System of Lighting as one which tends to **Popularize the Use of Gas** as an Illuminant, owing to the following Advantages:—

Economy in Consumption of Gas, combined with High Illuminating Efficiency.
Freedom from Smoke, Dirt, and Flickering.
Greatly Reduced Heat.
The combination of High Lighting Power with DURABILITY can only be obtained by The Welsbach System.

The "Lancet" Special Analytical and Sanitary Commission, in an exhaustive report, pronounces the "Incandescent Gas-Light System" to be the **Healthiest, Best, and most Economical System of Gas Lighting.**

Suitable for every purpose of **Inside and Outside Lighting.**

Avoid the WORTHLESS IMITATIONS now being offered by UNSCRUPULOUS INFRINGERS.

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OIL FOR GAS MAKING

PURE DISTILLATE.

HOMOGENEOUS IN CHARACTER.

NO MIXTURE.

CAN BE STORED SAFELY ANYWHERE.

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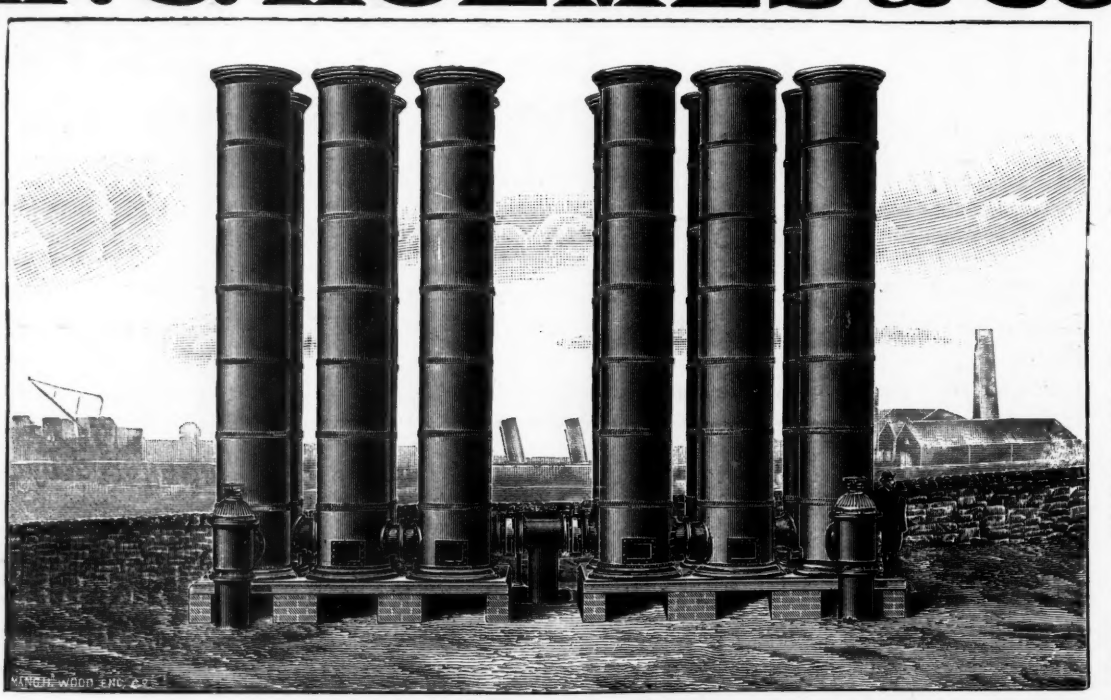

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COAL and COKE Breakers, Elevators, AND Conveyors.

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We desire to call attention to our SHALLOW REGENERATIVE SETTINGS, which are comparatively inexpensive to erect, and productive of excellent results. They are specially designed to suit those Retort Houses where for various reasons it is undesirable to excavate to any great depth.

We shall be pleased to furnish Designs and Estimates on application.

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THE ADVANTAGES OF THIS SYSTEM ARE:

1. Simplicity of Mechanism.
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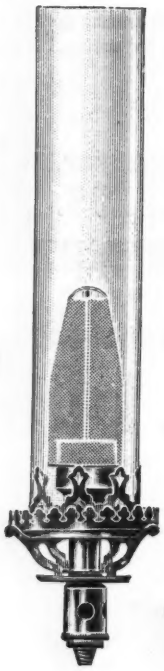

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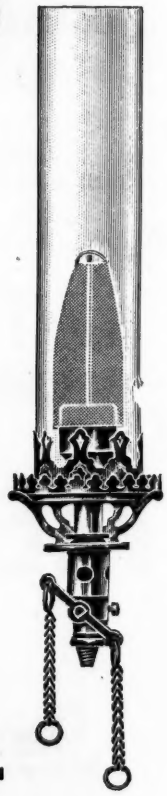

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THE IDEAL LIGHT FOR DOMESTIC USE.

SUNLIGHT MANTLES

PRODUCE A DIFFUSED LIGHT OF SOFT RAYS,

The NEAREST APPROACH to the LIGHT of the SUN.

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Patent REGENERATIVE SETTINGS,

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SUITABLE FOR WORKS OF EVERY CAPACITY,

AND A SPECIAL FORM OF WHICH IS APPLICABLE TO

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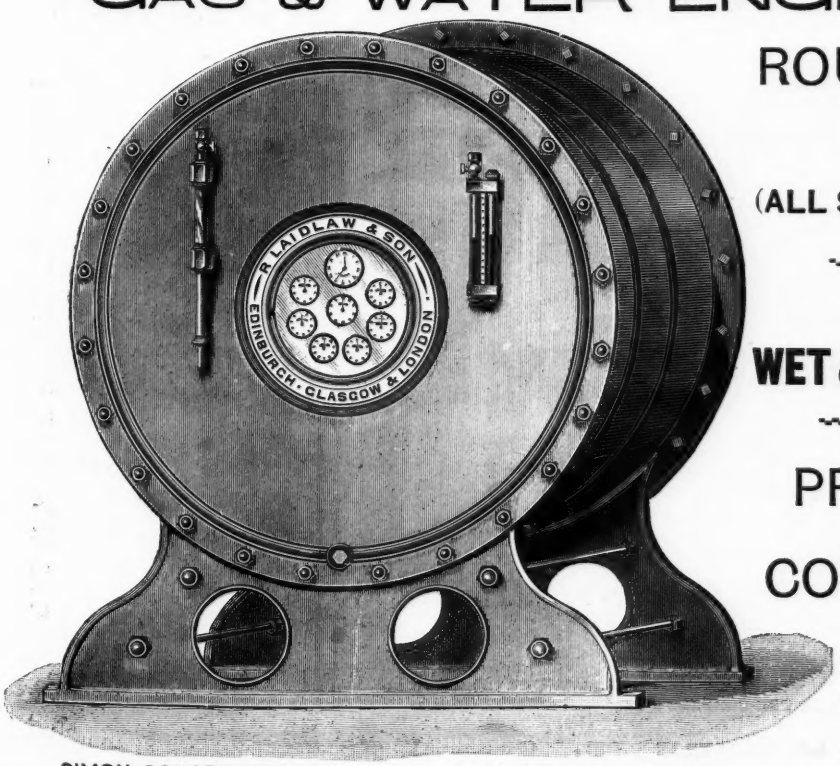

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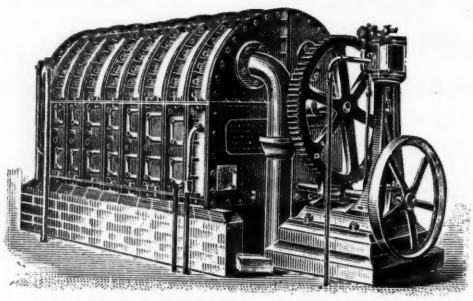
This Apparatus upholds its title, the "STANDARD;" being recognized by leading Engineers as the most efficient Apparatus for the Extraction of Ammonia from Coal or other Gases.



The Largest Order ever given for WASHER-SCRUBBERS was recently received being for **16** Patent "Standard" Washer-Scrubbers, each for 3,500,000 Cubic Feet of Gas per day.

Number of Patent "STANDARD" Washer-Scrubbers in use at this date

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WET AND DRY GAS-METERS, STATION METERS, GOVERNORS, GAS APPARATUS, ETC.

SQUARE STATION METERS WITH PLANED JOINTS.

STATION METERS IN CYLINDRICAL CASES.

DESIGN No. 2 PATTERN.

STATION METERS MADE AT THE COMPANY'S WORKS, OLDHAM, LATE WEST & GREGSON. Established 1830.

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SINCE 1893

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Have constructed or have in hand

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FOR THE FOLLOWING UNDERTAKINGS:—

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Belfast	1,700,000	Holyoke, Mass.	600,000
Belfast (Second Contract)	4,500,000	Edinburgh	2,000,000
Glasgow	300,000	St. Joseph, Mo.	750,000
Brussels	700,000	Lea Bridge	350,000
Brussels (Second Contract)	700,000	Lea Bridge (Second Contract)	350,000
Liverpool	3,500,000	Guildford	350,000
Tottenham	750,000	Stockton-on-Tees	500,000
Tottenham (Second Contract)	750,000	Syracuse, N.Y.	850,000
Santiago	400,000	Brentford	1,200,000
Swansea	750,000	Commercial Gas Co.	850,000
Manchester	3,000,000	Commercial Gas Co. (Second Contract)	850,000
Brighton	1,750,000	Bridlington	125,000
Preston	1,500,000	Middlesbrough	1,250,000
New York	1,200,000	Croydon	1,250,000
Southport	750,000	L. & N.W. Railway, Crewe	700,000
Bath	1,000,000	Taunton	225,000
Newburgh, N.Y.	350,000	Lawrence, Mass.	400,000
Newburgh, N.Y. (Second Contract)	250,000	Rotterdam	850,000
Hoylake	125,000	Dorking	125,000
Coventry	600,000	McKeesport, Pa.	500,000
Coventry (Second Contract)	600,000	The Gaslight and Coke Co., Bromley	3,750,000
Bordentown, N.J.	125,000	The Gaslight and Coke Co., Nine Elms	2,750,000
Winchester	200,000	Durham	200,000
Shanghai	225,000	New York (Remodelled)	11,000,000
Stockport	500,000	Scarborough	800,000

LIVERPOOL (Second Contract) . . . . . 4,500,000 Cubic Feet.

In addition to which the 1891 Installations of The Gaslight and Coke Company, on the Humphreys' Double-Superheater System, have a capacity of 12,000,000 Cubic Feet per diem.

IN THE UNITED STATES,

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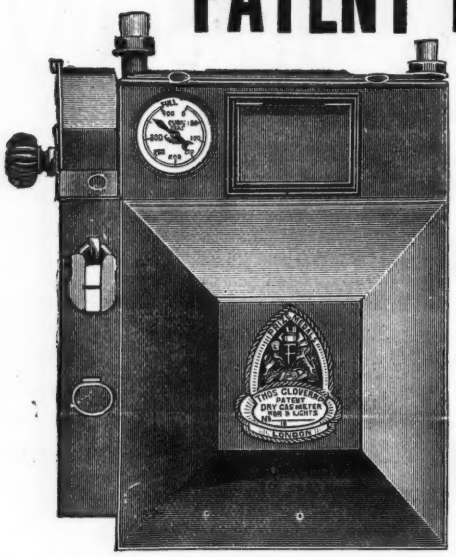

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TO CORRESPONDENTS.

No notice can be taken of anonymous communications. Whatever is intended for insertion must be authenticated by the name and address of the writer; not necessarily for publication, but as a proof of good faith.

EDITORIAL NOTES.

The Gas Institute Meeting Postponed.

LAST week we published the official notifications as to the meetings of the Incorporated Gas Institute and the Institution of Gas Engineers for the present year. The former is to be held in Belfast, under the presidency of Mr. James Stelfox, the Engineer and Manager of the Belfast Corporation Gas-Works; the other meeting will be in London, with Mr. George E. Stevenson, of Manchester, succeeding Mr. Corbet Woodall in the chair. It cannot have escaped the notice of our readers that, as arranged, the meetings would have clashed. This unfortunate state of affairs was brought about by a circumstance for which the ruling body of neither organization was responsible. As soon, however, as the fact became known, steps were taken by Mr. Stelfox and the Council of The Gas Institute to prevent so regrettable a *contretemps;* and it is with great pleasure that we are now able to correct the former notification, and state that while the Institution fixture will hold good for Tuesday, June 14, the Belfast gathering will take place just a week later. The Institution had no choice in the matter, if they were to fulfil their engagement to receive the members of the Dutch Gas Managers' Association in return for the graceful hospitality shown to them on the occasion of their autumn meeting in Holland. In acting so promptly, to relieve an awkward situation, Mr. Stelfox has done a good deed in the best interests of both societies; and the readiness of the representatives of the older organization to give up their own regular date in the circumstances, is a fraternal act that merits the high appreciation with which the announcement will be received on all hands.

Alteration of the London Gas Referees' "Notification."

IT will be seen by the detailed statement which appears in another column that the Referees' "Notification" respecting the methods to be observed in testing London gas has been amended. The alteration, however, is only in respect of the times and mode of testing for purity, not for illuminating power; and is consequent upon a recent decision of the Chief Gas Examiner, Dr. A. W. Williamson, F.R.S. It is unnecessary to give further particulars of the alteration here. The gas industry has been expecting an alteration of another kind. It was to have been supposed that something would be done in the matter of superseding by some form of pentane standard the candles used in testing. But it is remarkable how long this standard takes to "materialize" in action, notwithstanding the abundance of the blessings that have been showered upon it in its experimental embodiments. There is quite an extensive "pentane standard" literature, amid which the unaccustomed student may well lose himself. Moreover, this mass of printed matter is continually being added to, while a practical conclusion always seems to be getting farther off. The London Gas Companies and others would be only too glad to accept a reliable and handy standard of light for photometrical use, provided they could be certain that the standard would not lay any heavier burden on them than that which they have learnt to bear through a third of a century and more.

The Result of the London County Council Election.

THE London County Council election took place last Thursday, with the result that the Progressive party gained a substantial majority. Consequently, for the next three years we may expect a considerable development of the peculiar policy with which the party has been identified these nine years past. The attempt to popularize Conservative principles with the whole London County Council electorate has failed, for reasons which are not far to seek. Though it is easy to apply the machinery of national party political organization to a municipal election, it is impossible to identify the issues of parliamentary and local government contests. In this instance, the Moderate party have identified themselves with the humdrum issues of economizing the rates, and leaving well alone in social matters. Consequently, their opponents taunted them with having "no policy." They, the Progressives, were free to promise the electors a new heaven and a new earth, to be created under Trade Union auspices at the expense of the ground landlords, the "monopolists"—in short, of anybody except the voters. Is it to be wondered at that the Progressive

vote was overwhelming in all of the electoral districts where the voters do not pay rates directly? The efficient and economical administration of the local affairs of the County of London should be a pure question of business; but, as matters go, it is treated very differently. London has tried the experiment, which works fairly well in the majority of English boroughs, of electing its local governing body on the lines of a parliamentary contest; and the result is that the so-called municipal election has this last week turned out altogether differently from the parliamentary record.

One palpable reason for the discrepancy is that while Londoners, as Englishmen, take their fair share of interest in party politics, they do not concern themselves to the same degree with municipal politics. London is altogether too big and too loosely organized to be infused with the municipal spirit. A quarter of a million of working people in this amazing city live and work under one system of local government by day, and depart for another every night. London is not a town, but a geographical expression. As a statesman remarked recently with regard to British interests in China, the interest of the nominal Londoner in the place where he gains his livelihood is a commercial, not a territorial interest. With the residential Londoner the case is different. The inhabitant of South Kensington or of Dulwich pays his own rates. He is not attracted by the promises of the "friend of "humanity" who comes to him in the modern guise of a Progressive; and accordingly he votes for a safe man. The denizen of Deptford, on the other hand, never sees a rate-paper. When a glib speaker promises him and his like direct employment under the public authority, on the Trade Union rate of wages, and no questions asked as to efficiency so long as the ticket is clear—what is to be expected? Is he likely to turn away from this philanthropic gentleman, and vote for a person who will only promise to be careful of the public money? The result of Thursday's election shows that he will vote for what he has been led to believe is the policy of bread-and-butter for himself.

The reproach that the London County Council has comported itself more like a "little Parliament" than a municipal administrative body is justified by the fashion in which the candidates belonging to the two opposing parties were distributed among the constituencies. Very little observance was shown, on either side, of the consideration of "local influence." Where the seat was understood to be a Progressive one, a good Progressive was sent to contest it, regardless of whether or not he had any natural connection with the neighbourhood. It was just the same with the Moderate who was told off to oppose him. In too many instances the latter was an aspiring barrister, or some young man of family seeking an entrance into public life. The fact that the party which had committed itself publicly to the task of attaching the County Council more directly to the soil of the constituencies, so to speak, was nevertheless constrained to put forward these stranger candidates, showed the utter hopelessness of the ideal. This fact is, of course, susceptible of various interpretations. One view is that the creation of a municipal spirit in the different districts into which London is more or less naturally divided can best be done by the scheme of decentralization which the Government have promised to introduce into Parliament this year. The other is that matters had better be left to go on as they are—which, of course, is the view of the party that finds its profit in this application of "carpet-bagging" to the County Council constituencies.

There is, of course, a serious danger in this kind of election; but it is easier to recognize than to avoid. The fact that not more than half the voters went to the poll on Thursday is not to be overlooked, neither is the equally significant circumstance that the only decent polls in point of numbers were those recorded for the candidates put forward by the two chief party organizations. Independent candidates, "Labour" candidates, and Socialist pretenders were absolutely nowhere. Well, London has made its local government bed, and must lie upon it for the next three years. The working-class vote of the electoral divisions where people do not, as a rule, pay their own rates, has decided the spirit in which the rates of the Metropolis shall be spent. The voice of the City, of Westminster, of Kensington, Marylebone, Paddington, Hampstead, Holborn, the Strand, the West-end—all, in short, that the nation and the civilized world is usually understood to mean when it names "London"—is stifled in the pronouncement of Lambeth, Battersea, Deptford, Whitechapel, and the like regions. Under the Equalization of Rates Act, the minority will contribute to the funds of which the majority will have the disposal. This is what the result of the election looks like on the surface. The best that can be hoped for is that the Progressive bark will be worse than the bite. We have no great hopes, however, that the Progressive victory will mean fair treatment for the objects already marked out for the operation of Progressive reforming zeal.

Why Are the Poor Always With Us?

THE Central Poor Law Conference was held last week in the Guildhall of the City of London; and an interesting discussion on the causes and cure of pauperism occupied the delegates during the whole of the first day. The puzzle of pauperism meets the student of political economy on the threshold, and never leaves him. Over and over again the most heedless of us must have asked ourselves why it is that there is pauperism in rich countries where there is plenty of work to be had and wages rule high, while in what are called poor countries there is little or none of it. Mr. J. W. Gibson, the Clerk to the Newcastle-on-Tyne Board of Guardians, has studied paupers in the way of business for twenty-nine years. He has formed the uncomfortable opinion that pauperism is slowly but surely increasing. The tendency is fostered by socialistic teaching, which would convert the whole world into a vast poorhouse. Incidentally, he criticized Trade Unionism as contributing to pauperism through its economical blunder of the "minimum wage." His reason for holding this opinion was that "when men began to age "they were paid off, and frequently became pauperized, "although employers would be willing to retain them if "they were permitted to receive such wages as they could "earn." We think it questionable, however, how far workmen who are inefficient, whether through advanced age or any other disability, should be kept pottering about a works. Gas-works have been particularly liable to this kind of thing; but we believe it to be a mistaken way of treating the difficulty, except within strictly defined limits. It is cheaper to pension off deserving old hands than to encourage them to play at earning a small pittance. Their presence about a works only gives an air of slackness to the whole establishment which it is worth money to get rid of. This, of course, as a general rule.

Mr. W. Fisher gave the Conference the socialistic view of the subject. The primary causes of pauperism, he submitted, are private ownership of land, the tyranny of capital, and the extreme waste in the production and distribution of commodities. What the poor want is not charity, but justice. There can be no approximation of justice so long as capital is simply made the instrument of exploitation, instead of the servant and the friend of the workers. Mr. Fisher's contention, therefore, was that the causes of poverty are economic; that the people are alienated from the means of production; and that wealth is intercepted by the few, and is degrading in its nature and uses. One has heard such rhapsodies before; and like the farmer's experiment with claret, they do not help us to get any "forrarder." On the other side, Mr. T. Mackay holds among the causes of pauperism "the delusions of Socialism" and "the impediments placed by Trade Unionism to the "free flow of labour into the better-paid industries, and the "jealousy with which it regarded that successful expansion "of industry which is the best guarantee for the ascent "of labour." This impeachment of Trade Unionism was very warmly resented by the Trade Unionists present; but Mr. Mackay was firm, and lamented the misdirection of some of the best energies of the country to the pursuit of so many fruitless ideals.

The Socialists and Trade Unionists at the Conference strangely shied at the obvious truths that drink, betting and gambling, thriftlessness, bad health, and sheer misfortune, are together sufficient to account for so much poverty, misery, and pauperism that, if they could be eliminated, the economic aspect of the subject would, to say the least of it, be vastly simplified. Where is the helpfulness of making tirades against private ownership of land, "capital," and various other stock bogeys of the Socialistic Trade Unionist, while everybody knows that the average working man drinks a great deal more than is good for him or than he can afford, bets and gambles

whenever he has the chance, and wilfully refuses to think how he can improve his own lot? One of the delegates to the Conference—a journalist—told the meeting that newspapers could not exist if they did not cater to the gambling propensities of the people. How are the Socialists going to deal with this question in the new earth they profess to be able to create when they get possession of the land, and there is no capital left to trouble the world? If they know how to suppress drunkenness and gambling, and how to make all men and women self-respecting, why do they not start upon the job here and now?

Crisis in the South Wales Coal Trade.

EVERYONE who is interested in any department of the coal-mining industry of the country must be curious as to the solution of the difficulty that has lately arisen between the employers and miners of South Wales. It is matter of common knowledge that the payment of men working for the associated Monmouthshire and South Wales colliery owners, with an output of 30 million tons of coal a year, has been determined since 1875 according to a sliding-scale system devised by Sir William Lewis. Up to the present, the working of the system has proved satisfactory to all parties; though at the time of the great Midland coal strike an attempt was made to break in upon it. During all these years the South Wales men have been earning their wages, and the output of coal has been continuous. Adjustments have been made from time to time; but the older men among the miners have hitherto valued the cause of peace too highly to lightly sacrifice the system which has produced this result in a region once distracted by strikes. Now there appears to be greater risk than ever before of the sliding-scale coming to an end. Notice to terminate the agreement has been given by the men, to expire with the present month. Meanwhile, the representatives of both parties are discussing amicably the causes which led to the giving of the notice; and a satisfactory settlement is not beyond hoping for. There are, however, dangers to be faced, not the smallest of which is the circumstance that hardly any of the present generation of pitmen interested in the affair know what a strike means. There are plenty of professional agitators who would be only too glad to give them instruction in this regard; but it is to be hoped that the provincialism of the Welshmen will help them, for once, to decline the questionable friendship of English strike leaders. If the younger men will but listen to their tried advisers, all may yet be well; but for the present they do not seem greatly disposed to do this. The employers naturally desire the maintenance of the sliding-scale. But everything has its price; and if the workmen ask too much, the employers will decline to pay it for an accommodation which, after all, is more to the men's interest than their own. The men have become infected with the heresy that if the output can be "controlled" the price of coal will be raised, and with it their wages. Up to the present, they declare they will not consent to the continuation of the sliding-scale, with any modifications, unless the employers will agree to the principle of controlling the output, and guarantee to put it into operation within three or four months from this time. The employers, for their part, state that, having fully investigated and discussed the principle of control, they are determined not to entertain it, because it is impracticable, and would prove abortive. Hence a dead-lock has arisen, the solution of which is not yet apparent. It would be a national misfortune if the trade of one of our most important coalfields should be upset over a contention that need never have cropped up among practical men. That it has done so goes to show how liable the working classes of to-day are to be swayed by purely hypothetical considerations.

The Home Office and Water Gas.—There is evidence of a movement on the part of the Home Office on the subject of water gas. A circular letter is being sent out, stating that the Secretary of State has appointed a Departmental Committee to inquire generally into the question of the manufacture and supply of water gas. It has been urged, on the one hand, that this gas constitutes such a source of danger to the community that its use should be regulated by law; while, on the other, it is contended that no serious danger arises from the use of this or similar gases containing a large proportion of carbon monoxide, and that the number of accidents that might be traced to the gas was not sufficient to warrant any interference. The Committee are asking for any information on the subject which may be thought helpful to them in their investigations.

WATER AND SANITARY AFFAIRS.

LESS than half the ratepayers of London went to the County Council poll last Thursday; and the result is seen in an election which "The Times" has properly described as "decided by the absentees." That the working-class vote exercised considerable influence appears by the fact that constituencies in which this element predominates in nearly all cases elected Progressives. Such being the choice of working men where they had most power, we may presume that their vote went the same way where their power was less. The result comes to this—that property has been to a large extent outweighed by labour in the recent contest. The Progressives have been wise in their generation. They have won over—we will not say they have virtually bribed—the working man by the promise of increased wages and easy employment; the Trade Unions being also thoroughly approved and supported. The Works Department, with its thousand men, has accorded with the dreams of Socialism; and the name of Mr. John Burns has resounded in every workshop. The Moderates have nothing to show like this. They cannot undertake to throw the ratepayers' money out of window that the crowd may scramble for it. They can only promise such good things as are reasonable and right, and as will be permanent, though less dazzling at the outset. All the arguments of "The Times" and the Conservative organs have served to emphasize the fact that the Progressive is the man to spend the public money, and the Moderate is the man to be careful of it. The cue has been taken, and the wages class judge that their interest is on the Progressive side. The truth must be spoken, though we hardly like to say it. But the issue comes to this—that under Progressive rule property is the less secure. The Moderates are accused of guarding vested interests. But are such interests to be sacrificed? The circular issued by the Directors of the Metropolitan Water Companies, calling upon the shareholders and debenture holders to do their utmost to support the Moderate candidates in the election, was thoroughly warranted. It may have been duly responded to; but the unfortunate result remains that a party impregnated with socialistic ideas is now paramount in the government of London. The consequences that are thus rendered possible are not limited to the Water Companies.

Mr. W. H. Dickinson, the Chairman of the Water Committee of the London County Council, when called to give evidence before the Royal Commission on the Metropolitan Water Supply last week, commenced by saying that the general policy of the Council since 1891 in reference to the water supply of the Metropolis had been based upon, and strictly followed, the recommendations of Sir Matthew White Ridley's Committee. Nevertheless Mr. Dickinson went on to show that the Council by a distinct resolution declared themselves unable to accept the condition contained in one of the six recommendations made by that Committee; this condition being that the Council, if constituted the Water Authority, should be required to purchase the undertakings of the eight Companies by agreement, or, failing agreement, by arbitration, within a fixed period. The process of arbitration was one which the Council wished to encompass with certain stipulations, directly calculated to affect the question of value. In fact, it was to be such an arbitration as had never been heard of before. The true value of the undertaking of any Water Company was declared to be dependent on the liabilities to capital expenditure for new or supplementary sources of supply in the immediate future. In other words, in proportion as London grew and the business of the Companies increased, so should the necessary expenditure of capital in the future be held to diminish the present value of the business already transacted. That is to say, a going concern was to be considered so much the less valuable because of the outlay which would be necessary to secure its development in years to come. If London were stationary in regard to its population, so that no increased demand for water was to be expected, the "liabilities to capital expenditure" would be so much the less, and the properties would be worth so much the more. The County Council failed to recognize or to admit that the enlarged expenditure on capital account would be accompanied by an increased revenue, by which the dividends would be maintained. But the Council expressly stated that dividends or "Stock

"Exchange values" had, in their opinion, nothing to do with the "true value" of a Company's undertaking. The Chairman of the Commission, when confronted with this economical doctrine, was induced to ask Mr. Dickinson whether it was his opinion that, in order to arrive at the true value of a Water Company's undertaking there were "problems to be solved which are beyond the province "of any ordinary arbitrator?" This interrogation Mr. Dickinson answered in the affirmative; saying there must be an arbitrator appointed with special powers to deal with the proposals. It is thus declared that the arbitration must be extraordinary and special, altogether outside the lines of any reasonable interpretation of the condition prescribed by Sir M. W. Ridley's Committee, though Mr. Dickinson wished the Commission to understand that the Council had strictly followed the recommendations of that Committee.

We dwell on these points for two reasons—first, because the terms and conditions of purchase in respect to the water undertakings lie at the root of the whole question; and, secondly, because the constitution of the County Council now just elected ensures a persistence in the policy to which the Council became distinctly pledged in 1891—a policy which, in fact, has characterized the proceedings of that body throughout. But there is a further view to be taken of this decision of the Council; and it is fortunate that we have it in words, constituting a manifesto which must either be maintained or repudiated. The possible expenditure of capital for new or supplementary sources of supply very clearly has relation to the cost of bringing a supply of water from Wales. We may thus understand that the purchase price of the existing works is to be subject to a heavy discount, in order to assist the capital expenditure for carrying out the Welsh scheme. Mr. Dickinson says the Council have always thought that the result of "ordinary arbitration" conducted under the Lands Clauses Act would be to give the Water Companies "a present of six or seven millions of money." This so-called "present" can be nothing else than part of the real value of the article to be purchased. But it also represents the amount of spoliation to be inflicted on the Water Companies—a species of enforced contribution towards the £17,000,000 estimated as the cost of a water supply from Wales, which would be less than that now given by the Companies, and therefore entirely inadequate for the future. For the supply of 415 million gallons per day, the cost is to be close upon £39,000,000. Mr. Dickinson has estimated that the figure at which an arbitrator would arrive as the value of the Companies' undertakings, taken on the basis of their income, would be not less than £30,000,000. These statistics occur in a "private memorandum" which Mr. Dickinson prepared in 1891 at the request of the Water Committee of the Council, and in the course of which he stated that the Thames and the Lea would suffice for the supply of the Metropolis until 1931, but that subsequently a large expenditure would be necessary to make a supply from these sources adequate both in quantity and quality. Under the prevailing circumstances, Mr. Dickinson in his memorandum advised that the Companies should go on supplying London until 1931, and that then the Municipality of London should take over the water supply, paying "the actual value" of the plant and materials. The interests of the ratepayers would clearly suggest that the Companies should be left to face the future; and this they are evidently prepared to do. The disturbance is on the part of the County Council, who wish to obtain possession of the supply. But if the Companies are to go on for thirty-three years longer, it is certain that the capital account must grow; and it is this which the Council are determined as far as possible to prevent, on the ground that it will increase the price to be paid when the works are taken over. For this reason they opposed the Staines Reservoirs scheme, and are now opposing the Bill of the Southwark and Vauxhall Water Company. After contending that the Companies are liable to expend more capital to meet the growing demand, the Council seek to prevent the Companies from raising any capital to do so. But the Council have no desire that the existing sources should be proved sufficient to meet the wants of London, even for thirty years to come.

It will be seen from our "Parliamentary Intelligence" that the Wymondham Water Bill was thrown out on second reading, without a division, on Tuesday last. From a letter which appears in another column from Mr. Percy Griffith (who, we understand, was the Engineer to the proposed scheme), it will be gathered that the promoters feel that they have been very hardly used by this summary dismissal of their Bill at the second reading stage; and we are disposed to agree with the writer that, if this should become a precedent, it will deal a serious blow to private enterprise in promoting Bills of this nature. Whatever may be the facts as regards the water supply of large towns or cities like London, it is evident that the supply to the smaller towns and villages will never be efficiently dealt with if the matter is left to the local authorities. On the ground of expense alone, this must be apparent to anyone who studies the conditions under which these bodies can execute public works of this particular nature. The repayment of the loans added to the interest thereon involves a compulsory charge of more than 5 per cent. on all money spent in this way; and considering the low rateable values of rural districts, it is clear that public works carried out on the basis of the rates must be a very onerous matter. This being the case, the improvement of the water supply in such districts will generally depend upon private enterprise; and every additional expense or risk put upon such undertakings will tend to deter promoters from taking them up. For these reasons we think that second reading opposition should not be allowed on Private Bills of this character. In the course of the debate, Mr. Lowther, the Chairman of Ways and Means, expressed his opinion that the Bill should have been allowed to go before a Select Committee in the ordinary way; and we cannot see why an independent opinion of such weight should have been overruled by the House. The principles of Private Bill Legislation have been seriously affected by such a precedent; and we are inclined to think something should be done so as to prevent its recurrence except under very special circumstances.

Gas-Engines at Oil Wells.—Recent experience with gas-engines in the oil country of the United States for pumping oil wells, has established the fact that this form of motor gives much more satisfaction than the steam-engine. The substitution of gas for steam engines is therefore going on rapidly. During last year, upwards of 300 gas-engines were placed on oil leases, and are stated to be doing satisfactory work. They vary from 10 to 50 horse power, and cost about the same as a boiler and engine of equal strength. It is stated that twenty of the Standard Oil Company's pipe-line pumping-stations have been equipped with gas-engines.

Chemical Changes Caused by Silent Discharge.—At a recent meeting of the Paris Academy of Sciences, the above subject was dealt with by M. Berthelot. The action of the discharge upon the pure hydrocarbons was first studied. Marsh gas gave at first a little acetylene, which afterwards disappeared. After 24 hours, the remaining gas was practically hydrogen, only 5 per cent. of the methane being unchanged. With nitrogen, absorption takes place with the formation of basic substances. Detailed results were also given for ethane, ethylene, acetylene, propylene, trimethylene, and allylene, both alone and mixed with nitrogen.

"Plutonic" Cement.—Readers of the "JOURNAL" are familiar with this material for the repair of, and the prevention of porosity and carbon deposits in, gas-retorts. Its various applications were described some years ago by its introducer (the late Mr. W. Richardson, of Birmingham) in a pamphlet which has now reached its sixth edition, and is published by the "Plutonic" Cement Company. A somewhat grim frontispiece sets forth that it is presented "with Pluto's warmest wishes." The matter has been extended by the addition of some tables useful to gas managers, including the English equivalents of the metrical weights and measures, and blank forms for entering particulars as to retorts, mains, and services, and purifier-house memoranda.

The Proceedings of the Pacific Coast Gas Association, 1893-1897.—We have received from the Secretary of the above-named Association (Mr. J. A. Britton) the volume of collected "Proceedings" since the formation of the society in 1893. The interest taken in the Association by the gas managers located in its district may be judged from the fact that out of 57 gas companies 43 are represented, with a membership of 69—this number being raised to 109 by members from allied industries; while their zeal and earnestness in making the organization productive of good are testified by the variety of the technical matter presented at each meeting. This extends to 426 pp., and it is illustrated where necessary. There are several folding plates. Portraits are given of the four Presidents (Messrs. Crockett, Quilty, Jones, and Parker). The volume, which includes lists of the officers and members of the Association, has been produced under the editorship of Mr. Britton, who may fairly be congratulated on the result of his labours.

ESSAYS, COMMENTARIES, AND REVIEWS.

ELECTRIC LIGHTING MEMORANDA.

Profitable Electric Lighting—Unfair Municipal Competition with a Gas Company—Electric Lighting in the North of London.

It is with considerable satisfaction that we observe that a number of electricity supply undertakings succeeded last year in turning the corner, and realizing a profit on operations which have hitherto been carried on at a loss. A good deal of capital, and a vast amount of technical skill and downright hard work, are represented by these persevering enterprises; and nobody could rejoice over the permanent discouragement of so much that is worthy of recompense. It is quite a mistake to imagine that the gas industry as a whole would benefit if the electric lighting industry, also as a whole, were a failure. If there is to be rivalry in any line of business, it is better that the competition should be between fairly prosperous rivals than that one should be a reckless bankrupt. At the same time, the fact of so many electric lighting undertakings having become dividend-paying concerns helps to clear away the mystery that has been thrown, from interested motives, over the prospects of this business. Whether in the city or residential parts of the Metropolis or in a country town, the only source of electric lighting profits is a good and increasing amount of public patronage. This reads like a truism; but it is not so, as everybody will know who has studied the ways of speculative electricians. Given a suitable district, prudent capital outlay, and good management, and any electric lighting system will pay a fair dividend under statutory conditions. This is the open secret of the business. Some undertakings will return a profit sooner than others; and some can never pay at all. It is against the latter that the local gas interest is likely to be found in arms. If the insolvent concern belongs to a company, the management usually tries to do a "cutting" trade, to the annoyance of the gas company. If it is in the hands of the local authority, the resentment of the gas company against a not too scrupulous rivalry is heightened by the reflection that, as large ratepayers, the company are made to help grind the razor that is being used to cut their throat. Moreover, in these circumstances the local authority are apt to inflict every conceivable inconvenience upon, and put all sorts of hindrances in the way of, the gas company, with the notion of helping their own bantling. People would not believe how small, pettifogging, and mean our trading municipalities can be, unless they had experience of their ways in this regard.

An example of the sort of thing that is done by a municipality which enjoys the privileges of selling electric lighting and controlling the operations of a gas company recently came to our knowledge. In a town situated not a hundred miles from London, the Corporation Electric Lighting Committee discovered that in the lower-class business streets, where the trade done is largely in the "market" style, the butchers were not to be persuaded out of their ignorant preference for the familiar flaring gas-burners, which when used in generous profusion along the shop frontages impart a liveliness to the show of meat which the still, genteel incandescent electric lamps cannot produce. The butchers know what they are about. Their illumination is intended to eclipse the costermongers' naphtha flares; and this it most effectually does. But what do the Corporation Electric Lighting Committee do but stir up the Town Clerk, who discovers that under a bye-law the projecting butchers' flares are an encroachment on the roadway. Consequently, the offending shopkeepers are warned that, unless they remove every projecting gas-fixture, they will be prosecuted before the borough Magistrates. If they will use the Corporation electric lamps instead, nothing will be said, because there will be nobody to put the bye-law into force. Could it be wondered at if, in a town so ordered, the relations between the Gas Company and the Corporation were to become somewhat strained?

As was to have been expected, the announcement that gas is to be dearer in North London has stimulated advertisement of the advantages derivable from Vestry electric lighting. The adjoining parishes of St. Pancras, Islington, and Hampstead have electric lighting plants, and the parish of Shoreditch is not far off. This geographical consideration encourages "London" to hope that before long all the main roads of North London will be lighted by electricity; one parish taking on the work where the other leaves off. With regard to the financial results of this enterprise, it is stated that "in each case the returns are promising. In view of the increase in the price of gas, announced by The Gaslight and Coke Company, it must be very gratifying to these parishes, which have had the good sense to adopt lighting schemes of their own, to find they can supply light at a great saving to the rates." The last statement is not true; but this is the way by which public opinon is created. No one of the London Vestries that have gone in for electric lighting has yet earned a legitimate profit on the working, sufficient to provide for depreciation. The public lighting, wherever electricity has been adopted, is a much heavier burden upon the rates than it used to be; but inasmuch as the Vestries are able to mix up their accounts in this regard, the ratepayer does not know it. From the same source as that from which we have already quoted we derive another variant on the Shoreditch legend. "So satisfactory has been the scheme in Shoreditch, that the Vestry last month were seriously considering whether to reduce the charge." Thus an uncalled-for and rejected proposition becomes evidence of fact. But "this was not all," as "London" enthusiastically observes. No, indeed. We are told that Shoreditch "has had the advantage of obtaining power for the electric lighting station from the dust destructor without the expenditure of a penny in coal" There has been an impression abroad that a few pence have been spent upon coal for the Shoreditch installation, and some people are doubtful as to whether the coal helps the dust destructor, or the dust destructor the coal heap. However, time will show. Meanwhile, it would be prudent to reserve judgment upon the question of what influence the electric lighting ventures of the North London Vestries are likely to have upon the rates in the immediate future. The figures of the "pioneer" undertaking of the St. Pancras Vestry relating to the past year's working will soon be out, and when they appear it will be interesting to search into them for disclosures of the result of dust destructor working there; for Shoreditch is not the only place where the generation of electricity from fuel other than coal has been attempted. But, somehow, one does not hear much of these attempts after the first few months.

SOCIALISM AND ECONOMIC "DRY ROT."

A remarkable confusion of ideas underlies most of the socialistic teaching of the day. It is not only that its professors have no regard for the rights of the individual, and wish to apply the principles of Jack Cade to the disposition of property. These are things to be combated; and they may be resisted, despite the famous dictum, "We are all Socialists now." The curious fact is that the same mental twist which leads certain people to imagine that their neighbours' property should be theirs, and that they ought to share the fruits of others' efforts, equally unfits them to distinguish points of difference between things which exist.

Take, for instance, Mr. Robert Blatchford—one of the ablest advocates of Socialism in this country, though his name is not so familiar to the ordinary newspaper reader as those of many "comrades" who have not a tithe of his ability but are more practised in the gentle art of advertising. Still his writings are said to have wide circulation, and he has considerable popularity in the North of England. Just now he is engaged in publishing a series of "Letters to Working Men," the object of which is to explain the Socialist creed to the meanest understanding. He seeks, as he says, to "catch the ear of the heedless and untaught;" and he addresses himself in particular to errand boys, shoeblacks, farm labourers, and men and women to whom economics and politics are "dry rot." With his general teaching, we have no concern. It is summed up in the declaration that "as the principle of Socialism is 'England for the English,' so the principle of non-Socialism is 'every Englishman for himself'"—a sentence which embodies more than one fallacy. Our purpose is rather to call attention to the use which Mr. Blatchford makes of the gas and water illustration.

All Socialist teachers at some time or other refer to municipal gas and water works as examples of the benefits which may be expected to flow from the application of the principle of Collectivism. The reference is invariably to the bright side of municipal ownership; never to the mistakes of corporation management, to the petty ambitions, the jobbery, and personal ends which it tends to foster and promote in the average councillor, or to the injustice of making "profit" out of one section of the population in order that another section may be relieved of a proportion of the rates. So it is with Mr. Blatchford. In his case, however, there is apparently more than ordinary ignorance of the circumstances governing the supply of gas and water. He is writing of the evils of competition. "In London," he says, "there are several Gas and Water Companies. In Manchester, there is only one—the Corporation. In London, gas and water are bad and dear. In Manchester, they are good and cheap. If the London County Council provided the gas and water, there would be no more water famine; and I should be able to write these lines without trouble, which I cannot do now, although my gas-rate is over 4s. per 1000 cubic feet. Non-Socialists claim that this clumsy and costly way of going to work is really the best way there is. They say that competition gets the work done by the best men, and at the lowest rate." As an example of "the plain and pleasant" things with which "the ear of the heedless and untaught" is to be caught, these sentences are worthy of note.

We cannot follow this writer into the regions of prophecy. You cannot argue with a prophet; you can only disbelieve him. So we need not trouble about what might happen if the London County Council took over the supply of gas and water in the Metropolis. But it certainly is interesting to find the Gas and Water Companies held up as examples of the evil of competition. As a rule the Socialist-Progressive agitation-monger is content with denouncing them as wicked monopolies. To find that they are competitive is a positive relief; for we have the assurance of Mr. Blatchford that "competition is better than monopoly." But then unfortunately Mr. Blatchford knows nothing about it. He has not taken the trouble to acquaint himself with the elementary fact that though there are "several Gas and Water

Companies in London, they are engaged in the supply of separate areas, some of which contain a far larger population than Manchester; and that whatever might be the advantages of consolidation under one authority, the abolition of competition would not be one of them, since it does not exist. As to the price of gas, Mr. Blatchford's statement is misleading or worse. What he pays, we do not know. But it, of course, is not a fact, as he implies, that gas is 4s. per 1000 cubic feet in London or over any considerable part of its suburbs. Errand boys and ploughmen, and the rest of the ignorant and heedless, may object to "dry rot;" but if they are to be educated in economics, the basis may as well be facts as fiction—unless it is, as would seem, that facts will not fit in with Socialist theories.

STREET LIGHTING ALTERNATIVES.

Good work is deserving of praise wherever found; and we have pleasure in recognizing the excellent style in which our electrical contemporary "Lightning," in the current number, has set out the case for street lighting by means of electricity, chiefly in the form of arc lamps. Of course, this kind of thing is advertisement, and has to be regarded as such; but the advertisement columns of all technical periodicals are usually quite as useful, and almost as interesting, as the bulk of the other matter. There is an old-fashioned prejudice in favour of keeping the advertisement and editorial columns of technical journals separate and distinct; but all cannot conform to this rule. The time has long passed when newspaper advertisements could be printed anyhow; and it must be conceded that the manufacturing firms who have gone into the electricity fittings business are getting up their trade blocks and letterpress in a style that should cause the makers of gas-fittings to bestir themselves. Electrical journalists and their advertisers are doing their very utmost, now and always, to persuade the public that electric lighting is "coming in," and gas "going out." Besides the makers of incandescent gas-light fittings, and the owners of a regenerative lamp or two, where is there any similar effort put forward by those interested in the gas-fittings trade? The latter seem to be content to rest on the fact that gas is by no means "going out" as the electricians do vainly pretend; and everybody knows what a stumbling-block to the electricians is the incandescent gas-light. The Board of Trade returns prove that more gas-burners are being lighted every night throughout the year. During the last ten years the number of registered public gas-lamps in the United Kingdom has increased from 423,580 to 540,644. There is no indication that the process of growth is becoming slower, to say nothing of stopping or being reversed. Yet it is the "cue" of the electrical interest to pretend that the condition of things in regard to street lighting in the United Kingdom is the exact opposite; and they certainly "make believe" with a good grace.

We think it only right to make the matter clear in this way. Gas lighting is more in use than ever for street and private lamps; but we are not going to deny that a good deal of similar business is being done by electricity. It is all in the day's work for an electrical journal to vapour about the "healthier, brighter light on a statelier standard" superseding the "once-praised but now discredited illuminant, to the advantage of the health, security, and spirits of the inhabitants." The sanitary difference between an outdoor arc and a gas-lamp cannot be very appreciable, to make the most of it; and it does not follow that a "brighter light" is productive of brighter lighting. This is the familiar old delusion, of course; and the most significant feature of this newest presentment of the case for electric arc lighting is that it appears again, as prominently as ever. The reason is, we presume, that it is still a useful bait. Highway authorities here and there are yet caught with talk of 2000-candle power lamps; and accordingly electricians of the commercial traveller variety cling to the denomination, despite the protests of their more scientific colleagues. It is all very well for the man of science in his study to rate electric lamps in terms of their consumption of current. The men who have the lamps to sell find it pays best to talk of them by their "nominal" candle power; and so the custom is still persisted in.

Street lighting by means of electric arc lamps was the first public application of high-power electricity exhibited to the English people. It did not become popular. On the other hand, the system spread over the North American Continent like wildfire—a circumstance which the electrical interest regards as testifying to the "progressiveness" of American towns and the backwardness of English communities. The truth of the matter is, of course, that the American people had no choice in the business. The big electrical manufacturing "trusts" and the professional city politicians settled the whole thing; and the people had to put up with the lighting service arranged for them, and pay the bill. The rough post, the ugly lantern, and the sagging overhead wire were not so favoured here; and after a spasmodic exhibition of themselves for a year or so, they disappeared from the land. The resuscitated arc lighting of to-day, one willingly admits, is a different thing. Nobody would accuse the new pattern arc lamps so handsomely turned out by Johnson and Phillips, Siemens, Cromptons, Drake and Gorham, and other firms now in the business, upon the same grounds that served for the condemnation of the old Brush pretenders. Improvements have been made during the last fifteen years in everything connected with the arc lamp; and whoever is curious to know what are the actually available resources of arc lighting, as exemplified in the best English practice, cannot do better than procure a copy of the current issue of "Lightning." Here may be seen what they are doing with arc lamps in Londonderry, Cheltenham, Southport, Oxford, Brighton, and several other places.

The showing, on the whole, is a very creditable one for the Provinces. Not the most fanatical of electrical partisans can aver that these towns have lost anything through the imputed British backwardness to accept crude electric lighting appliances just because Americans chose to put up with them. We English people are often, with justice, accused of lack of taste in town building and improvement. Our streets are frequently meaner than they need be. We do not understand the art of vista-making, as they do in Brussels. If we build handsome public edifices, the probability is that we place them so that they cannot be properly seen. But we do not like trumpery electrical wires and posts in our streets. The new arc lighting appliances leave nothing to be desired as regards fitness, strength, and even elegance. Even the trolley-tramway wire, hopeless as it is, is at least neatly combined with the street arc lighting appointments at Leeds. All possible dispositions of arc lamps for street lighting are to be studied in different cities and towns of the United Kingdom. Edinburgh has done itself bare justice in the lamp-columns of Princes Street, where the columns are on the kerb and the lamps overhang the edge of the roadway. This overhang appears to be very general where the posts are in that position. Where the posts are in line in the middle of the road, the lamps are axial. The suspended lamps, dear to some, are to be seen hanging from span-wires at Cheltenham, where a tree-bordered avenue is lit in this style; and also in the narrow streets of Aberdeen. At Dover, light, ornamental steel arches spanning the throughfare from opposite frontages (by Strodes), are an improvement on the span-wire. The latter expedient gets over the objection as to the wind. All these varieties of practice are well shown in our contemporary's pages.

What is not given here, however, is the real cost of all this to the public, and the actual efficiency of the service rendered, regarded as lighting, not as a display of lights. In reference to cost, the experience of Londonderry is adduced to prove that a municipal street-lighting plant, supplying 175 lamps of 500 watts, can be run for something like £21 per lamp per annum, including everything but depreciation. Actually, the cost of the undertaking to the Corporation of Londonderry was £3665 for the last complete year. Mark how the figures are manipulated in the interest of electricity. The cost of the arc lamp, assumed to be of 1000-candle power, is £21 1s. 3d. "Now the usual cost of the nominal 16-candle power gas-burner, under the same conditions, is from £3 to £4 per annum; but we will give gas every advantage, and calculate it at £3 per annum for a 60-candle power incandescent burner. To obtain a total illumination of 174,000 candles (the output of the 174 arcs at the rate we have fixed above), it would be necessary to employ 2900 gas-lamps at a yearly expenditure of £8700, as against the £3665 which represents the total charge, including interest and sinking fund, entailed for a full year's electric lighting of the ancient city on the Foyle. *A very pretty saving, my masters, and one which must appeal to the common sense of even the stupidest and most prejudiced ratepayer in the world*, unless he happen to be a gas shareholder."

It is to be hoped that the "stupidest and most prejudiced" of Londonderry ratepayers will appreciate the reality of this "saving;" but we fear this is hardly likely to be the case, seeing that the city on the Foyle never had 2900 street gas-lamps to pay for, and certainly was never charged £8700 a year for the public lighting. The cream of the joke lies in the fact that Londonderry used to pay the Gas Company a street-lighting bill of about £2145 a year; and the Corporation thought the charge too heavy for the rates of the city to bear. Accordingly, they went in for electric lighting to save money. The question of candle power was never more than a subsidiary one with them; and wisely so, for the brilliancy of an electric arc lamp is no recommendation when, for reasons of economy, the next one must be almost out of sight. The real "saving" in the case of Londonderry takes the form of an increased public lighting rate; while the "improved" lighting is a matter of spots so widely scattered as not to amount to a respectable eruption. Lest our rendering of the story should be regarded as prejudiced, we will refer to what was published in this regard *circa* 1893-4. It was fully expected "that the annual payment now made to the Gas Company for street lighting will cover the repayments and interest of the loan of £15,000 granted by the Board of Works; and after the loan is paid off, the cost of lighting the city by electricity will be only one-third of the cost of lighting it by gas." Alas!

Another flagrant example of hoodwinking is furnished by our contemporary's statements respecting the electric light at Bedford. Here it is sought to be made out that electricity is "just equal in cost to gas at 2s. 1d. per 1000 cubic feet, and produces a saving of about 5s. 6d. per lamp yearly, if gas be charged at 2s. 6d." This comparison is based upon the charge made for the arc lighting; but inasmuch as the Corporation lost £1200 last year on their electric lighting undertaking, the basis in question seems to lack solidity.

Curiously enough, nothing is stated with regard to the use of arc lights in London, whether as contributing to the rental of the Metropolitan Electric Lighting Companies or as burdening the rates of certain enterprising Vestries. It is matter of common knowledge, however, that the Metropolitan Companies have of late done more business with arc lamps than formerly. Somewhat against their will, the St. James's and Pall Mall Company have been forced into lighting Regent Street and Waterloo Place by this system. It is doubtful if the price they get for the lamps pays the Company; but it is of greater public interest to note that the lighting in question is anything but an improvement of the thoroughfares to which it is applied. The lamp-posts are in the middle of the street, with the result that after the shops are shut the side walks are dingier than they have been for a half century. This in the West-end of London!

This experiment goes to show that in street lighting the propinquity of the light sources is as important a consideration as their intensity. Great brilliancy of the sources is worse than useless, if there are not enough of them to remove the reproach of spottiness. Here, again, it is chiefly the consideration of expense that governs the efficiency of the service. The experience of the London Vestries that have embarked upon electric lighting undertakings is that a street arc lamp cannot be maintained for less than about £26 per annum. This figure proves clearly enough that, in whatever respect arc lighting may have been improved of late years, reduction of the cost is certainly not one of them. The expense of any proposed substitution of electric arc for gas lamps is therefore mainly a question of the spacing of the lamps. Fix one arc lamp per mile, and the aggregate nominal candle power will still greatly exceed that of the gas-lamps to be found in this length of thoroughfare, while the cost may even be less. Something more than this, however, is usually considered to be expedient; and posts fifty yards apart is about the rule for fairly good arc lighting, with streets not too broad. Any greater distance than this, means pronounced spottiness. The efficiency of street lighting is to be gauged by the ratio between the degree of illumination received by the brightest and the darkest parts of the roadway between the bounding frontages, not by the intensity of the separate light sources. There are no brighter lights to be seen anywhere than are shown nightly on each side of the English Channel; but one would hardly call this public lighting. These are elementary and apparently obvious considerations; but such as they are, they are never recognized by the partisans of electricity. The style of comparative criticism of the gas and electric lighting services and costs followed by "Lightning," has already been exposed in the example of Londonderry. It is sufficient to say that if this way of stating the relative advantages of the two systems of street lighting were always followed, the electricians would never get an order for an installation.

We have acknowledged earlier in this article that the newer arc lamp-posts are not inelegant. It is necessary to remark, however, that some of these lamp-pillars exhibit a tendency to florid ornamentation that should be restrained. An over-finicking design in lamp-posts, whether for gas or electric lamps, is to be deprecated, especially in view of the state of dirt and neglect into which all such appurtenances of the streets are customarily permitted to drift. This is one of the things that they understand better in France.

THE SCOTTISH SHALE OIL INDUSTRY.*

THE technical literature of mineral oil is sufficiently voluminous and authoritative to render it imperative upon the writer of a new book upon the subject as a whole, or any branch of it, to show very good and sufficient cause why his contribution should be admitted to the restricted professional library of the oil expert or engineer. The name of Redwood, upon the title-page of a work of this character, is *primâ facie* evidence of worth. The Redwoods, however, are a clan; and Mr. Iltyd I. Redwood, who dates from Brooklyn—a safe distance from which to take an independent bird's-eye view of a Scottish industry—is a new voice upon this topic. He engages sympathy by his preface, which explains with truth that there has been no publication of a good deal of instructive detail in connection with "the development of an industry in which, under the stimulus of keen competition, remarkable technical skill has been exhibited;" and he proposes to supply this information for the benefit of all concerned. Gas engineers are in a degree specially interested in the technics of the shale oil industry, inasmuch as the distillation of shale for oil is a process resembling the carbonization of coal for gas closely enough to render the differences instructive. The financial circumstances of oil producers and the commercial prospects of the article are also of moment to the followers of the gas industry.

The first part of this book is historical. The beginnings of a great industry are generally most interesting; and those of the paraffin oil trade are no exception to the rule. By the way, it is worthy of passing remark that this name of paraffin oil, first popularized by the shale or coal oil traders, still remains the popular name for any kind of mineral oil—a fact which is significant of the extent to which the trade rose and spread in its heyday. It is difficult for the present generation—to whom cheap and abundant mineral oil has been familiar from youth up—to realize how the world fared in the "forties" and for some time after, with nothing but vegetable or animal oils for burning or lubrication. There was not anything to complain of on the latter score; but oil-lamps were as great a luxury as gas itself, and the light of the people was the tallow candle. It was in the early forties that James Young, "of Kelly," had his attention drawn by Dr. Lyon Playfair to the oozings of oil from cracks in the sandstone roof of the Riddings Colliery, at Alfreton, Derbyshire. Young advised his then employers, the Tennants, of Manchester, to work up the stuff for sale; but the firm thought the proposed line too insignificant for their notice. Consequently, in association with Meldrum, Young himself took a lease of the oil-bearing portion of the mine, and commenced in 1848 to prepare mineral oil for the market. The source of supply was a small and temporary one, and gave out in 1851. Young had foreseen this; and, being of opinion that the oil was the product of coal acted upon by subterranean heat, he experimented in the direction of producing it artificially by distillation. About this time, Mr. Bartholomew, of the City and Suburban Gas Company of Glasgow, showed Young a sample of Boghead coal, or "Torbanehill mineral," a trial of which at once put Young and Meldrum on the right track. It was not long before the original Bathgate works were started for the manufacture of paraffin oil from that mineral.

From cannel coal to shale appears but a short step, yet it took years to make; and it was not made by Young and Meldrum. Another name—that of Robert Bell—appears in connection with this transition, which was effected at Broxburn in 1862. Meanwhile the success of Young and Meldrum's business, which was carried on as a secret manufacture, attracted the inevitable rivalry. In the sixties, paraffin oil companies sprang up like mushrooms; but Young managed to keep the lead for a time, though in the end his policy of secret working, instead of patenting the processes of manufacture, led to disaster. Incidentally it may be remarked that the financial history of the paraffin oil industry, as recounted by Mr. Redwood, does not justify the notion so industriously spread abroad of late years that those interested in the trade have any claim to protection from the competition of other mineral oils in the shape of a fancy flash-point.

The competing companies stole one another's trade secrets, and indulged in cut-throat competition, a long while before the introduction of American petroleum placed the oil trade upon a new basis. Let us hear our author upon this point: "The different companies have been fighting one against another almost incessantly, trying to undersell, or raising injurious and untruthful reports with a view to ruining one another; and the industry would have by this time been practically a thing of the past had not the Standard Oil Company of America tried to act as a mediator between the several companies, and get them to combine and work amicably together, with a view to maintaining such prices as would enable them to pay the dividends due to their trusting (but often sadly disappointed) shareholders." This is a view of the offices of the much-abused Standard Oil Company in regard to the federation of oil producers which has not hitherto been studied. Mr. Redwood does not say why the Company came to the assistance of the Scotch oil companies *circa* 1886-7—a period which he declares to have been the most disastrous in the history of the trade. We shall not be far wrong in stating the reason in one word—paraffin. The competing concerns were not only spoiling the market for oil, but also destroying the prospects of paraffin wax, of which they were the principal producers. The Standard Oil Company were also producers of paraffin wax, for which they had an insufficient sale at home. Consequently, it was to their interest to keep up the market price of the commodity abroad; and they tried to teach the Scotchmen their own secret of combination. Of course, this touching example of international federation had nothing to do with oil, the supply of which article went on still upon Free Trade principles. So the Scottish Mineral Oil Association was formed in 1887, and the supply of paraffin was regulated in accordance with the interests of the majority of the producers. The Association, however, did not hold together. First one and then another of the constituent firms did a deal behind the backs of the others; and so the whole organization came to grief in about five years. Meanwhile the Standard Oil Company had perfected their arrangements for supplying petroleum in the United Kingdom; and the consideration of being able to fix the price of burning oil at will, consoled the Company for the wreck of the paraffin trade.

There appears from Mr. Redwood's statement to be any quantity of oil-yielding shales in sight in the Scotch country; but he is not very clear upon this point, which is of great practical importance. The financial prospects of the existing paraffin companies are not a matter of general interest. But the extent to which the demand for mineral oil in the kingdom might be met from native sources is such a matter; and on this head the author is regrettably silent. The other point is: At what price could a British burning oil be put upon the market, at a fair

* "A Practical Treatise on Mineral Oils and their By-Products;" including a Short History of the Scotch Shale Oil Industry, the Geological and Geographical Distribution of Scotch Shales, Recovery of Acid and Soda Used in Oil Refining, and a List of Patents Relating to Apparatus and Processes for Obtaining and Refining Mineral Oils. By Iltyd I. Redwood. London: E. & F. N. Spon; 1897.

profit, in the existing state of technical knowledge; and where could this industry be most advantageously located? Mr. Redwood does not give us any such broad views of the industry as are implied in these queries. On the other hand, his presentment of the details of the shale oil industry is most informing, and apparently trustworthy. If he does not allow us to "see the wood for the trees," his views of the "trees" are very precise. The questions we should like to have answered are the following: Given a capital of (say) £250,000 to employ in an industrial venture to pay 5 per cent. and maintain the value of the investment, would it be worth while to put it into shale oil making *de novo*? At what price could the product be profitably retailed?

With regard to the sulphate of ammonia production in shale oil works, Mr. Redwood is very candid. The Young and Beilby retorts, which represent the height of realized excellence in carbonization, are described as enabling most of the ammonia to be recovered. "The Young and Beilby retorts now in course of construction at some of the works are built entirely of brick, and have a round cross section of 36 inches diameter at the bottom and 24 inches at the top, and a height of 50 feet from the ground to the top of the retort." The yield of crude oil from different shales carbonized in these retorts varies from about 23 to 30 gallons per ton; but the yield of sulphate is very nearly a uniform 45 lbs. per ton. The author warns his readers against believing the extravagant stories circulated in the shale country, of certain works getting 70 lbs. or even 80 lbs. of sulphate per ton. It is stated that in the Young and Beilby retorts about 110 gallons of water, in the form of very low-pressure steam, are passed through for every ton of shale carbonized. The retorts are worked under a vacuum of 2 inches of water. It is not difficult to understand after this how all the available ammonia is steamed out of the carbonized shale.

On the whole, we are able to recommend this book as well worth buying, not only by students of the shale oil industry, but also by those who are interested in the mineral oil trades generally, and in sulphate of ammonia production, concerning which the author has some useful hints to offer. He is evidently a good practical hand, and knows quite well what he writes about, which is nearly everything in a technical writer. The text is illustrated where required by original figures and diagrams. We could wish the writer had given us some light upon the future of the Scotch oil trade; but this is almost the only disappointing feature of an otherwise admirable handbook.

OBITUARY.

We regret to record the death, on Monday last week, after a short illness, of Mr. W. Drewry, the Engineer and Manager of the Great Grimsby Gas Company. Deceased had held this position for seven years, and had previously filled a similar one at Cleethorpes. While at the latter place, he joined the newly-formed Eastern Counties Association, and described a simple breeze or dust furnace erected there. He subsequently contributed a paper on "Subsided Gas-Mains." His membership of the Association, however, was of short duration.

News reached us last week of the death, on the 20th ult., of Mr. M. Martin, who had for forty years held the appointment of Manager of the Drogheda Gas Company. The event is a mournful incident in connection with the transfer of the undertaking to the Corporation, which has recently been arranged. Mr. Martin was elected President of the North of Ireland Association in 1896; but as he felt unable to undertake the duties of the office when the members met at Omagh last August, his place was taken by the Vice-President (Mr. J. Nisbet, of Portadown). His death was rather sudden, as he was at his post only a few days previously. His removal is regretted by a large circle of friends, who attended the funeral on the 22nd ult.

PERSONAL.

Mr. J. Bruce, the Manager of the Lochgilphead Gas-Works, has been appointed Manager at Lockerbie, in succession to Mr. J. A. Young, who, as already announced in the "Journal," has gone to Louth.

The Leeds Corporation, at their meeting on Wednesday last, confirmed the appointment by the Gas Committee, notified in the "Journal" a fortnight ago, of Mr. Walter Hole, as Superintendent of their Main and Service Department.

At the meeting last week of the Institution of Civil Engineers, it was announced that Mr. G. M. Taylor, of Messrs. John Taylor, Sons, and Santo Crimp, had been transferred from the class of associate members to that of members; and Mr. C. H. Gott, of Bradford, was elected by ballot to the former class.

Mr. John Alex. Brodie, M.Inst.C.E., has been appointed City Engineer of Liverpool, in succession to Mr. H. P. Boulnois, M.Inst.C.E., who is now one of the Engineering Inspectors of the Local Government Board. There were 52 applicants for the position. Some years ago Mr. Brodie had eight years' experience in the work of the Council.

Mr. Louis Penny, M.Inst.C.E., has resigned the position of Engineer and Manager of the Bombay Gas Company he has held since October, 1881. Mr. Penny is a son of the late Mr. Alfred Penny, of Westminster; and before entering the service of the Bombay Gas Company he was Manager at Pará. The reason for the relinquishment of his present important duties is that, having resided in tropical climates for about twenty-seven years, he has earned the rest which he has decided upon taking, and which we trust he may be long spared to enjoy.

Mr. G. J. Symons, F.R.S., has just been presented by the Prince of Wales, as President of the Society of Arts, with the Society's Albert Medal, "for the services he has rendered to the United Kingdom by affording to engineers engaged in the water supply and the sewage of towns a trustworthy basis for their work; by establishing and carrying on during nearly forty years systematic observations (now at over 3000 stations) of the rainfall of the British Isles; and by recording, tabulating, and graphically indicating the results of these observations in the annual volume published by himself."

Owing to continued ill-health, Mr. H. S. Freeman has resigned the position of Engineer of the Wandsworth and Putney Gas Company, which he has held for twenty-nine years. The Directors accepted his resignation with great regret; but they have testified their desire that his long connection with the Company should be continued by appointing him Consulting Engineer. Mr. H. H. Jones, of Margate, son of Mr. H. E. Jones, M.Inst.C.E., the General Manager of the Commercial Gas Company, has been selected to succeed Mr. Freeman. It is somewhat curious that Mr. Jones's promotion coincides with the retirement of Mr. Louis Penny, of Bombay, to whom he was assistant for five years.

Mr. George Helps, of Hinckley, having obtained the appointment of Engineer and Manager of the Nuneaton Gas-Works, in succession to Mr. P. G. Winstanley, sent in his resignation, which was considered by the District Council last Thursday. A desire was expressed to retain Mr. Helps' services, as an important extension scheme, prepared by him, is in hand; and a resolution was passed to increase his salary £20 per annum. Mr. Helps expressed his thanks for the continued confidence shown in him, but said he was not able to retain his position as Gas Manager. If, however, he could be of any service in connection with the new works, he should be pleased to meet the Council's wishes. It was decided to advertise at once for a new Manager.

Mr. Henry Simmonds, the Manager of the Colne Corporation Gas-Works, has been selected from 51 candidates for the vacant engineership of the Bury Corporation Gas-Works, which was advertised in the "Journal" some weeks ago. The commencing salary is £350 per annum. Mr. Simmonds is 34 years of age, and a native of Reading. He was educated at the Grammar School in the town; and on leaving that institution was articled to Mr. John West, M.Inst.C.E., then the Gas Engineer of the Manchester Corporation. On the completion of his term, he was appointed Assistant-Manager at the Cheltenham Gas-Works—a post he vacated after three years in order to go to Colne, where he has held the managership for eight years. Mr. Simmonds will commence his new duties a month hence.

On Monday of last week, Mr. and Mrs. James M'Gilchrist celebrated their silver wedding at their residence at Dumbarton, where they entertained a numerous company of friends. Among the party was Provost Garvie, who, on behalf of the Gas Committee of the Corporation, presented the host and hostess with a massive silver tray, bearing a suitable inscription. The employees at the gas-works, who were entertained the same evening to supper, asked Mr. and Mrs. M'Gilchrist to accept a pretty silver salver, bearing the following inscription: "Presented to Mr. and Mrs. Jas. M'Gilchrist, on the occasion of their Silver Wedding, by the Employees of the Dumbarton Corporation Gas Department, 28th Feb., 1898." Some appropriate verses, framed, were also presented. Mr. M'Gilchrist returned thanks for the gifts, which he said would be highly valued.

The Lincoln Corporation are losing the services of their Water Engineer, Mr. Henry Teague, whose connection with the water-works undertaking dates from its commencement—now more than half a century ago. He is in his 78th year, and feels that the responsibility of the office should now pass into other hands. His resignation was accepted with regret by both the Water Committee and the Corporation; and the former passed the following resolution: "That, in submitting with much regret to the Council Mr. Henry Teague's resignation as Engineer of their water-works undertaking, the members of the Committee are anxious to express their unqualified regard for the most efficient and unselfish service which he has rendered to the citizens of Lincoln for upwards of 50 years—more than half of that period as an official of its Corporation—in maintaining a constant and wholesome supply of water with a very careful consideration to the expenditure incurred, and for his ungrudging aid in other departments of the public work. In Mr. Teague, Lincoln has for more than a generation benefited by the exertions of an unobtrusive public servant. He will carry with him in his retirement the goodwill and gratitude, not only of the citizens of Lincoln, but of many a public body and private individual who sought his services, and valued his work. The Committee are assured that the Corporation will desire to be associated with this just and sincere tribute of respect, and to join in this public record of regret and of regard."

NOTES.

The New Vauxhall Bridge.

It is proposed to build a new bridge across the River Thames at Vauxhall, in accordance with a design embodying the principle upon which the Thames Embankment is constructed—namely, of granite backed with concrete. It will be in five arches; and it will be difficult to render the structure architecturally imposing, because it will be 760 feet long and only 28 feet high above Trinity high-water mark. With regard to this feature, it has been agreed that some detail shall be introduced which will break up the long parapet line; and the Chief Engineer (Sir A. Binnie) has suggested doing this in a manner which has proved most successful in a similar bridge over the Rhone at Geneva, by the introduction of columns which will ultimately carry the lamps for the illumination of the roadway and river. The lamps will be of bronze. This is the first time that the arrangements for artificial lighting have been allowed their due importance in the design of a Thames bridge within the Metropolitan district. It will be interesting to observe how the suggestion works out.

Fog Created by Electric Arc Lamps.

A paper was recently presented by Mr. C. T. R. Wilson to the Philosophical Society of Cambridge on the production of cloud by the action of ultra-violet light on moist air. If the light of an electric arc lamp is brought to a focus by means of a quartz lens, within a vessel containing moist dust-free air, a bluish fog becomes visible in the course of a few minutes along the path of the light. The cloud particles remain in suspension for hours after the light has been cut off. The phenomenon is shown even in unsaturated air; but the faint blue haze which then develops takes much longer to form. When the radiation is not sufficiently intense to show these effects, a dense fog can still be obtained by bringing about slight supersaturation by expansion. These clouds, unlike those obtained by Tyndall and by Aitken, are due to the action of the ultra-violet rays alone; for if a thin sheet of glass or mica, opaque to these rays, is interposed, not a trace of fog or rain is formed even when a high degree of supersaturation is brought about by expansion. It is possible that the small particles to which the blue of the sky is due are the result of this action of the ultra-violet rays, of which sunlight, when it first enters our atmosphere, doubtless contains a plentiful supply.

The Ringelmann Smoke Scale.

Mr. Bryan Donkin has spoken favourably of a device originated by Professor Ringelmann, of Paris, for indicating approximately the apparent density of smoke issuing from factory chimneys. In many towns, regulations exist forbidding the emission from industrial chimneys of "dense" or "black," or even "dark grey" smoke. These terms are indefinite and at best relative. They lend themselves to mistakes and unfairness, besides being a fruitful source of disputes between parties. The Ringelmann system is designed to afford to honest smoke inspection a standard for reference. A set of cards 8 inches square, numbered 0 to 5, are ruled into small squares by black lines of graduated thickness and equal spacing. The following is the scheme of ruling as given by Professor Ringelmann: Card 0, all white; card 1, lines 1 millimetre thick, ruled at 10 millimetre centres; card 2, lines 2·3 mm. thick; card 3, lines 3·7 mm. thick; card 4, lines 5·5 mm. thick; card 5, all black. In use, the row of cards is hung conveniently at a distance of about 50 feet from the observer, in a line with the smoke. At this distance the lines are indistinguishable; the cards appearing to be of different tints of grey. It is not difficult to note which card most nearly corresponds in colour with the smoke at any moment. Observations should be made continuously during a period of (say) one minute, and the average taken as indicating the degree of density for this period.

Paint Vehicles.

In an article on "Paint Vehicles" written for the "Ironmonger," it is stated that the great defect of linseed oil—the porosity of the dried coat—is incurable. Stress is laid upon the necessity of cleaning all metal surfaces intended to be protected from rusting, by means of a linseed oil paint; but even where this is properly attended to the protection is of a temporary character. The thicker the layer of paint, or, in other words, the more coats are applied to the work, the less porous the whole will be; but there is an obvious limitation to the process of procuring protection in this way. Moreover, the linseed oil film is liable to suffer change after prolonged exposure. The linoxyn—which is the name given to the oxidized oil—sometimes crumbles or perishes like dried india-rubber; or, more rarely, it liquefies. The practical result is the same in either case—the paint loses its protecting value. Since a spirit-varnish contracts in drying, while a linseed oil paint expands, it would appear that, where the two are properly combined, supposing the relative proportions to be correctly adjusted, the result should be a varnish-paint that will neither crack nor blister. Yet, as a matter of fact, the porosity characteristic of linseed oil paints remains. A mixture of this kind is difficult to make when a metallic oxide is the pigment used with the two vehicles. One of the newest adulterants of linseed oil is "tung oil"—otherwise called Chinese or Japanese wood oil—now being introduced into the market. It dries quickly of itself, and is readily amenable to the influence of driers; but it yields an opaque white film instead of a transparent one.

TECHNICAL RECORD.

THE TESTING OF LONDON GAS.

An Amendment of the Gas Referees' "Notification."

In consequence of a recent decision of Dr. A. W. Williamson, F.R.S., the Chief Gas Examiner for the Metropolis, the Gas Referees (Dr. William Pole, Mr. A. G. Vernon Harcourt, and Mr. C. V. Boys) have been led to reconsider the terms of their "Notification" prescribing the times and mode of testing gas. The definition of the "day" for gas testing purposes as running from 9 a.m. on one day to 9 a.m. on the following day was, we believe, given in the City of London Gas Act, 1868. On the occasion above referred to it was contended before Dr. Williamson that a testing for purity was invalid in which the gas had been tested during some twenty hours belonging partly to one "day" and partly to another. The appeal was allowed; and consequently for the future it is necessary for all tests to extend merely from 9 a.m. to 9 a.m. The question thereupon arose as to whether the requirement of the Act is that the gas tested shall be wholly gas supplied within such period, or whether the washing out of the apparatus and the determination of the amounts of ammonia and sulphur which the liquids contain must also be done on the same day. It might certainly be contended that these operations are part of the testing; but the common-sense view surely is that this should not be the meaning, and that the Act would be complied with if all the gas tested belonged to one day. The Gas Referees have therefore had to devise means by which a record can be taken automatically of the time at which the testing of the gas ceased, 10 cubic feet having passed through the meter, and also the conditions (temperature and pressure) under which the gas was at the time the testing ended. The portion of the "Notification" of the Referees dealing with this special point has therefore been cancelled, and the following substituted:—

> The testings for purity shall extend over not less than 15 hours of each day, and shall be made upon 10 cubic feet of gas. This testing must be started between 9 a.m. and 5.30 p.m., and must be concluded before 9 a.m. on the following morning. The gas shall be tested successively for sulphuretted hydrogen, ammonia, and sulphur compounds other than sulphuretted hydrogen, in the manner hereinafter prescribed.
>
> The testing will be concluded as soon as the passage of the gas is stopped by the action of an automatic lever-tap attached to the meter. The liquids in the sulphur and ammonia tests, and the slips of paper in the tests for sulphuretted hydrogen will then contain the sulphur and ammonia which were present in the gas supplied to the testing-place during the day which ended at 9 a.m. The chemical examination of these liquids may be made on the following day—that is to say, after 9 a.m.

In the portion of the "Notification" describing the mode of testing for ammonia, it is specified that the gas is to be made to pass at "the rate of about half a cubic foot per hour." These words are altered to "a rate of not more than two-thirds of a cubic foot per hour."

In testing for sulphur compounds other than sulphuretted hydrogen, it has hitherto been the practice to pass the gas through a meter by means of which "the rate of flow can be adjusted to half a cubic foot per hour, and which is provided with a self-acting movement for shutting off the gas when 10 cubic feet have passed." The words "to half a cubic foot per hour" are now cancelled; and after the word "passed" are added the words, "and for stopping a clock so as to indicate the time at which the testings terminated. The Gas Examiner shall enter in his book the time thus indicated, as also the time at which the testings began." In the cautions to be observed in selecting and setting up the apparatus, the examiner is instructed to see that the inlet-pipe fits gas-tight into the burner, and that the holes in the circular stand are clear. If the burner gives a luminous flame, he is to remove the top piece, and having hammered down gently the nozzle of soft metal, perforate it afresh, making as small a hole as will give passage to "half a cubic foot of gas per hour at a convenient pressure." For the word "half" the Referees now substitute "two-thirds of."

As the "Notification" stands at present, when the number of grains of sulphur in 100 cubic feet of gas has been ascertained, it is to be corrected for the variations of the temperature and atmospheric pressure in the manner indicated for illuminating power, but with this difference—"that the readings of the barometer and thermometer or of the aerorthometer are to be taken for the day on which the testing commenced and also the day on which it closed; and the mean of the two is to be used. The reading of the aerorthometer at the time at which the passage of gas through the meter is cut off may be taken by means of a registering aerorthometer in which the column of mercury is shut off by a lever-tap similar to, and connected with, that of the meter." The words quoted are now cancelled, and the following substituted:—

> that the mean of the aerorthometer readings found at the beginning and at the end of any testing shall be taken as the reading for that testing. The reading at the

beginning of the testing is to be made by the Gas Examiner, who before leaving the testing-place will set the columns of mercury level in the two tubes of the instrument, and will connect the lever-tap of the aerorthometer with that of the meter. The fall of the lever of the meter will release a similar lever turning a tap which closes the tube of the aerorthometer. The reading of the aerorthometer as it stood at the end of the testing will require a small correction for the difference in level of the mercury in the two tubes, which is to be made in the following manner: Let R be the corrected reading, r_1 the actual reading of the aerorthometer, r_2 the reading of the companion tube, h the mean height of the barometer in units of the aerorthometer scale—a figure which will be printed on each instrument. Then—

$$R = r_1 \times \frac{h + r_1 - r_2}{h}$$

The aerorthometer reading is the reciprocal of the tabular number. The Gas Examiner shall, not less often than once a month, verify the adjustment of the aerorthometer, by comparison of the reading with the tabular number; and if the error exceed 1 per cent., he shall have his instruments examined and readjusted.

Until any testing-place has been provided with the recording instruments hereby prescribed for use, and until the instruments thus provided have been examined and certified by the Gas Referees, the testings are to be continued as heretofore.

EUROPEAN GAS AFFAIRS FROM AN AMERICAN POINT OF VIEW.

In the summer of last year, Mr. Walter S. Allen, who was at one time Secretary to the Board of Gas Commissioners of Massachusetts, paid a visit to Europe for the purpose of studying the business of gas supply as conducted on this side of the Atlantic; and, at the request of the President of the New England Association of Gas Engineers, Mr. Allen put his notes into the form of a paper which was read at the meeting of the Association in Boston on the 16th and 17th ult. The author has favoured us with an advance print of the paper, which, though the production of one who is confessedly "outside of the technical side of the gas business," will, we think, be found sufficiently interesting to be included in the proceedings of a body of technicians. Pending the publication of our usual abstract report of the meeting, we give the principal portions of Mr. Allen's paper.

The first impression received in England was that gas managers make much greater efforts to do away with manual labour than is the case in America. Small operations, which no one here would think of doing in any other way than by hand, have provisions made to relieve them of manual labour. For instance, in one works where considerable coke was sent away by rail, in laying out the new works provision was made for a sunken track along the side of the coke heap, so that in loading the coke for shipment there should be no exertion wasted in raising it to the level of the car, but that it could be simply shovelled over.

Much more attention is paid to mechanical methods of handling coal than is done in America; and even in comparatively small works portable railway tracks and miniature locomotives are employed for handling coke and coal. This question of the economical handling of coal seems to be something which interests every one; and a paper by the Engineer of the Danish Gas Company, read at the meeting of the Institution of Gas Engineers,* received more attention than any other subject. Of course, in the larger gas-works the system of mechanical handling is much developed; and in such works as the Tradeston Station at Glasgow, the most modern station of the admirable works controlled by Mr. Foulis, neither coal nor coke is handled by manual labour from the time the coal comes into the works on an elevated railway track until the coke goes out in the consumer's waggon. [The author described the arrangements.] Mr. Foulis claims as the entire charge for retort-house labour, in which he includes the men breaking coal, the rate of 6d. a ton, say 1¼c. per 1000 cubic feet. Of course to compare strictly mechanical charging with manual charging as to cost would require the consideration of wear and tear on retorts and tools, and interest on the cost of installing the plant. Moreover, it is extremely doubtful whether such appliances could be made useful in works as small as those of our principal American cities. But it seems as if this question of mechanical handling of coal and coke has been allowed to fall into abeyance to such a degree by the introduction of water-gas processes, that our engineers have neglected to apply their inventive ability to devising some small and simple charging machine, which might be applied to advantage in works of moderate size.

Of course, the great competitor of these mechanical appliances is the inclined retort; and, while I did not on this trip actually see inclined retorts in operation, I had a number of conversations with engineers, both in England and Germany, in regard to them. The Imperial Continental Gas Association, the great English Company which controls so many works on the Continent, is extremely enthusiastic in favour of the inclined retort. Established for the first time on a large scale in their works in Vienna, improved and carefully worked out by Mr. Drory, the Chief Engineer at that place, all officials connected with the Company give it their unqualified approval. Mr. Herring, formerly at Huddersfield, and now the Engineer in Edinburgh, who has made very exhaustive experiments with it, is equally enthusiastic. But there is one serious drawback to the inclined retort, and that is the proper angle for setting it. Every kind of coal has its own angle of slip. We all know that heaps of two different varieties of coal will present different angles when the coal is piled up in the yard; and so it is with the inclined retort. In order to have the coal lie evenly along the floor of the retort, not backing up against the front end, nor refusing to properly slide down, we must have exactly the proper angle for the kind of coal with which we are dealing; and if you look at the literature in relation to inclined retorts, you will find considerable variation among the authorities as to the proper angle for setting. It is perfectly possible to use inclined retorts to great advantage if we always keep to the same kind of coal—that is, the coal from the same seam. But very few works are able always to command one and the same coal; so that the practical working of inclined retorts may present great difficulties.

The question of inclined retorts and mechanical charging is being fought out. As against mechanical charging comes the large capital cost involved in establishing the plant; as against inclined retorts, the technical trouble about the slip of the coal. Strong claims are made by both sides as to the saving of cost and labour; and the results given by the advocates of the two systems are so contradictory that it is exceedingly difficult to draw any safe conclusion. In Vienna, the new municipal plant now in course of construction is built entirely with inclined retorts; but the English are more chary of committing themselves wholly to this system. One large plant where I found a new retort-house in process of construction had level retorts. This station—the Ayleston Road Station of the Leicester Corporation—is one of the best arranged plants to be found. The Engineer, Mr. Colson, was fortunate in obtaining a level plot of land of considerable extent, situated on the line of the railroad, and also on the line of a canal. Here he has planned and partially erected works on a large scale; and the most complete arrangements are made for every part of the business. The usual appliances for making, purifying, and storing gas have been built with due allowance for future increase; and in addition there is a large electric-lighting plant. For the treatment of residuals there is a sulphate of ammonia apparatus with a Claus sulphur kiln and tar-distilling plant, in which the tar is separated into naphthas, crude carbolic acid, crude anthracene, and pitch. There is also provided a reading and recreation room for the men, fitted with a stage where entertainments are given, and daily and technical papers and games, including cards, are provided.

We are inclined to think in this country that the item of saving of labour is not a question with which the European manager has to deal; but certainly the English manager is now experiencing as much trouble with his labour account as the American manager. Wages are nominally low—say $1·25 a day; but in England no gas manager of works of any size is able to make his day more than eight hours. He has three shifts, and three shifts at $1·25 a day bring the price of retort-house labour very close to American figures; and when it is considered that the English manager has a selling price for his gas not more than two-thirds, and in many cases less than one-half what is charged by companies of the same size in America, it will at once be seen that this high rate of labour is of the very gravest importance.

When, some years ago, as the result of strikes, it became practically necessary to concede the eight-hour day to all the retort-house labourers, managers succeeded in increasing the amount of work to be done by each man to some extent; so that if eight hours' work was paid the same price as was formerly paid for twelve, the increase in actual cost to the manager was not 50 per cent., but from 35 to 40 per cent. This increase came all at once; and at about the same time came the strikes of the coal miners, by which the price of coal went up enormously. Not only did the price go up, but coal was not to be had; so that managers, even in the largest of works, were sweeping out their coal-sheds and saving every pound of coal upon which they could lay their hands. Moreover, the price of residuals—tar, sulphate of ammonia, and coke—fell about this time with great rapidity; so that there remained no set-off against the increased cost of coal and labour. The prices of sulphate of ammonia and of tar seem destined to remain at comparatively low levels. The increase in the use of the closed-oven process for the manufacture of coke with bye-product recovery, and the erection of large tar-recovery plants at those blast-furnaces in Scotland which still use raw coal for ironmaking, which are thrown in and out of service as the state of the market allows, promise to place a limit on any substantial rise in the value of tar and ammonia. With sulphate of ammonia at the price of £7 10s. per ton, as it was last summer, none of these recovery

* See "JOURNAL," Vol. LXIX., p. 1120.

plants take any trouble to save the liquor. But with sulphate at £10, as it is by the present quotations, all start work.

Among the small appliances seen in English works for the saving of labour, I noticed an apparatus for painting holders and roofs by means of spraying the paint on. On investigation, I found it was the same thing that was invented by an American engineer for the purpose of painting the great surfaces of the buildings at the World's Fair in 1893—a little apparatus run by compressed air, and throwing the paint in the form of a spray from a nozzle. This costs very little money, and yet enables one workman to paint an enormously greater surface than is the case with painting by hand. Apparently the English appreciate American inventions better than we do ourselves.

A topic always of interest to American gas engineers is the development of the use of water gas in England. This has gone on in the last three or four years very rapidly; and while in most cases the general opinion is that there is no great saving to be made by the use of water gas for enriching in place of cannel, yet every engineer agrees that its use has had the effect of holding the price of cannel coal within reasonable limits. Towns like Liverpool and Manchester, where the statutory requirements call for 20-candle gas, have been obliged to use large quantities of cannel; and for many years they have been forced to pay high prices for this material. Now, instead of the engineers being obliged to run after the coal dealers to beg for cannel, these men are offering, even in mid-winter, immediate deliveries of cannel at reasonable prices.

The oil used for water gas is mainly Russian, and of the grade known as "solar distillate;" being somewhat heavier than our burning oils, with a specific gravity somewhere about ·840. But Manchester has recently bought a cargo of American oil, which it is enabled, since the opening of the Manchester Ship Canal, to bring directly to that city. A certain amount of shale oil from the Scotch refineries is also used. The types of plant employed seem to be only two—the U.G.I., as put up by Messrs. Humphreys and Glasgow, and the Merrifield-Westcott-Pearson, as used by Mr. Pearson in Toronto.

Of course the introduction of water gas started the same outcry in relation to its poisonous qualities as was the case in America; and at the time I was in Edinburgh that seemed to be the storm-centre, as the water-gas plant there had just been completed, but not put in operation. Manchester and Birkenhead were also busied with this topic. In Liverpool it seemed to have ceased to create interest; and, while water gas was being supplied in the summer time almost exclusively, the agitation had died down.

On the Continent, the widespread introduction of the Welsbach light, and other burners of a similar type, has somewhat reduced the demand for a gas of high candle power; and managers are generally of the opinion that for the use of the Welsbach light gases of from 12 to 14 candle power are quite as efficient as those of from 18 to 20 candle power, so that no necessity is felt for enriching by means of water gas or with cannel. In Munich, the plan of enriching by benzol still continues to be used, but only for a small enrichment—say to bring the gas from 15 to 17 candles; and it was frankly admitted that at the prices of benzol ruling last summer it was impossible to use this method. But the Company there had fortunately made a contract for a term of years for benzol at a very low rate; so that they were still able to employ this method profitably. Apart from the lack of demand for gas of high candle power on the Continent, the high price of oil places water gas outside practical consideration; and very few engineers have studied its manufacture except in a very general way.

In Dessau, at the headquarters of the German Continental Gas Company may be found a great variety of matters of interest. Herr von Oechelhaeuser, Managing-Director of the Company, has made of the station at that place a laboratory, and whenever anything appears promising it is tried. Thus when the electric light question became of interest, plant for the production of electricity by the use of gas-engines was installed, and this was speedily supplemented by a storage battery, both of which have worked very successfully. The electric light load in Dessau is peculiar. The place being the capital of a small duchy, the palace and the Court theatre call for considerable light; and as the theatre is only open a few nights a week, and 60 or 80 lights suffice for the palace except on gala nights, when 1000 are often needed, it will be seen that a storage battery is of the greatest convenience.

At this place I saw in active operation a gas tramway, of which all have heard more or less, but which in the last few years seems to have dropped out of sight. This is not due to any technical trouble in the development and operation of street cars by gas power, but entirely to the present competition existing among electrical manufacturing firms, by which these firms are willing to offer to municipalities desiring to do away with horse cars concessions far in excess of those which good business judgment would sanction. Under these conditions, the management of the Gas Tramway Company, which is identical with that of the German Continental Gas Company, has abandoned any attempt at present to enter into agreements with municipalities for the introduction of its system, but is now engaged in working out the problem of applying gas power for use on secondary railroads—short branches where it would not be profitable to run a service of locomotives, but which furnish a reasonable amount of freight and passengers to the main lines of the railroads. For this work the gas-engine is not placed inside the car which carries passengers, as in the street tramway service, but a small locomotive is built, usually with a 20-horse power engine. The tramway, as operated in the streets of Dessau, runs quietly and steadily. A slight amount of steam is emitted from the condensing water; and when the car is at rest there is some vibration from the engine, but not to any disagreeable degree. This vibration is being lessened with each new car built.

The use of gas-engines seems to be rapidly growing in Europe, and in isolated places a good many designed for the use of Dowson gas are going in. This combination is compact and easily managed, and produces power at a very low rate; it being claimed by some English authorities that by this means the cost of power may be reduced to 0·5 c. per horse-power-hour. The relatively high cost of the engine has undoubtedly rendered its introduction in America difficult; and now that the electric companies by their push have familiarized the public with the use of the electric motor, it will, I fear, be difficult to obtain possession of the field for the gas-engine. In Europe the situation is reversed; and the electric motor is obliged to make the fight against the gas-engine in control of the field.

Going outside of the works, one of the most striking features, both in England and on the Continent, is the universal use of the incandescent gas-light for street lighting. Towns like Bradford, where 2500 such lights are installed, like Rome, and like Munich, present streets lighted very differently from those of American cities supplied with the usual flat-flame 4-feet burner. On every side one hears the greatest satisfaction expressed as to the character of the lighting; and most exhaustive studies have satisfied managers that, with proper care in installation, there is no excessive breakage of mantles.

Of course, it must be admitted that the field for the incandescent gas-light in Europe is undoubtedly far greater than it is in America. The average candle power of the gas supplied in England, France, and Germany would probably not be far from 14 candles, as against 20 to 25 candles in American cities. The contrast between a 4-feet burner giving 12 candles, and an incandescent gas-light burning 3 cubic feet and giving 50 candles, is so considerable that their universal use becomes necessary. In Munich, one of the Engineers of the works stated that if I walked through the principal streets and looked in the shop windows and at the interior of the shops as well, he doubted if I should find a single store lighted by the ordinary flat-flame burner. I spent an hour, between five and six in the afternoon, in winter, in walking through the streets where the principal retail shops are located, and saw only two stores using flat-flame burners. In Munich, where the electric light is good and reasonably cheap, we find the same state of affairs as in America—shop windows lighted by electric light, and the interior of the store lighted with Welsbach incandescent gas-lights. In Paris and in Brussels, where incandescent gas lighting is developed to the highest degree, a few Denayrouze burners were seen; but they were not considered to be entirely satisfactory.

Much greater efforts are made in Europe to get the small consumer than is the case in America. In London, nearly one-quarter of the meters of the South Metropolitan Gas Company, supplying the poorest district, are of the prepayment type; and it has been found that among this population of the very poor the consumption of gas will average 800 cubic feet per month. In order to secure this consumption, the Company carry the pipe into the kitchen, furnish a stove and pipes, and connect up, and also one burner for light, free; but they charge enough for gas, in addition to the regular rate, to get from this extra charge a return equal to the interest and depreciation on the fittings. In Paris also the Company are doing much in the same direction. They have now adopted the plan of, in most cases, putting in and retaining the ownership of the rising pipe in all apartment houses; and in apartments which rent for less than $100 (£20) per annum they also supply the interior piping and meter connection free.

A subject of some interest to nearly all of us is acetylene; and in Europe the development of its use has been far more rapid than here. Especially in Italy has this gas been exploited, not, however, in the form of compressed gas charged in cylinders, but in the form of calcium carbide, used for generating gas wherever it may be used. In some small hotels I have seen the gas employed for lighting the courtyard and public rooms; and I understand that in this direction the Company in Milan who manufacture the carbide have been having considerable success. Milan has a weekly journal devoted entirely to acetylene; and I have recently had notice of a German one devoted to the same subject, besides having found several very good books published in both French and German, showing far greater general interest than the subject awakens in America. I have just heard that certain railway trains in France and Germany are now lighted by means of liquid acetylene. All trains of cars on the Continent of any importance are lighted by gas, while in England such use is quite rare. A few trains, notably on the Hungarian State Railways, are lighted by electricity. I am referring now, of course, to ordinary express trains, and not to special trains like the Orient express from Paris to Constantinople, and the Indian mail train from Calais to Brindisi, for which are charged very much higher fares, as they are fitted with great luxury.

I was fortunate enough to be able to attend the meeting of the Institution of Gas Engineers in London, and then had the

pleasure of seeing many of the most prominent men in the gas business; and nothing could have exceeded the courtesy shown me by all engineers with whom I came in contact. At this meeting, one of the papers which received the closest attention, and also very considerable discussion, was that by Mr. George Livesey, the Chairman of the South Metropolitan Gas Company, on profit sharing and a project for having a workman-director. I presume our American Associations would consider these topics to be beyond the scope of an engineers' society; but in England engineers consider them to be of equal importance with those relating to the details of the management of their gas-works. Mr. Livesey is undoubtedly one of the most brilliant men in the gas business to-day, and anything which he may bring forward is presented in such an original and forcible manner that it is worth anyone's attention.

Having acknowledged the great courtesy he received from a number of gentlemen prominent in the gas industry, whose names are given, during his investigations, Mr. Allen goes on to say: My queries were mainly confined to the administrative side of the gas business on topics which, while of interest to all, have, I believe, been ruled out of any papers to be read at this Association. Everyone I met was ready to answer any technical questions which I might put; and managers of municipal works and members of gas committees were extremely free in pointing out the benefits or the disadvantages in the systems of municipal management with which they were connected. One of the most striking points in connection with such management is the great variation in the manner in which the engineers are treated by their committees. In many works the engineer is looked upon merely as a hired man, to carry out the plans proposed by his committee; his advice is not asked. The committee draw the plans, buy the materials, and order the engineer to do the work, and then hold him responsible for the results, which are quite as often bad as they are good. In some works, on the other hand —and these works naturally have the best of the talent in the engineering profession—the committee consult the engineer, allow him to draw up the plans, report upon the feasibility of a scheme before it is tried, and in general treat him in such a way as to make him responsible, and at the same time give him a fair opportunity to show his ability.

In one important respect gas-works in England are managed far differently from our own. I refer to the practice of charging new work to operating expenses. The English practice—and indeed the English law—requires new work to be charged to construction; and then, after proper allowance for depreciation and a small reserve fund, it is held that all the profit made belongs to the shareholders or to the consumers. If the profit is excessive, the law forces a reduction of the price under the working of the sliding-scale, which prevents the payment of large dividends, unless at the same time the consumers obtain the benefit of a low price for gas. The result of this policy is that the present generation obtain the benefits, and do not contribute, from the money paid for gas, or, if a stockholder, from the money he is entitled to receive as dividends, amounts which enable the next generation to get cheaper gas or higher dividends. The English policy seems to me the correct one. So long as the State interferes with the selling price of gas, there is neither equity nor justice in restricting dividends in order to build up a plant out of earnings which belong to the owners of the works—that is, to the stockholders. This holds true also in the case of municipally-owned works; but in this case the whole people are the owners.

I feel as if it were presumptuous for me to attempt to tell engineers what there may be of technical value on the other side of the water; but I trust it has been of some interest to you to hear of some of the points which interested me. In conclusion, I can only say that if any can get an opportunity of making even a flying trip to England and Germany they will find many things of interest, and I think of profit; and they certainly can count on a most cordial reception from all the members of the profession in both countries.

EXTENSION OF THE GAS TRAMWAY SYSTEM.

The satisfactory behaviour of the gas-driven tramcars in Dessau is leading to a further extension of the system there. It was recently reported that one of the small cars first used had run a distance of more than 11,000 miles without fault or breakdown, while the gas consumption and maintenance charges were throughout very moderate. Three new cars, provided with motors of 12 to 15 horse power, have now been ordered to cope with the increasing demands on the service. A gas tramcar which was on trial in Paris a few months ago weighed, when in working order and loaded with 42 passengers, only 10 tons; whereas the compressed-air tramcars in the city weigh about 15 tons, and the electric cars about 14 tons. The gas car had a 15-horse power motor, and on level stretches easily maintained a speed of nearly 10 miles per hour. The three gasholders on the car had a joint capacity, at normal pressure, of 44 cubic feet, and were charged at a pressure of 10 atmospheres. Consequently, the weight of the gas carried when the holders were full was only about 14½ lbs. On the level, and with clean rails, the consumption of gas amounted to only 28½ cubic feet per mile run; but under adverse conditions it rose to 45½ cubic feet per mile. On a line with easy gradients, one charge of gas should suffice for a run of over 12 miles, and tramway journeys in towns rarely exceed 6 miles; so that one charging-station would suffice for most services. About 18-horse power per hour would be required to compress sufficient gas to a pressure of 20 atmospheres at the charging-station for the supply of a double service of cars at intervals of 10 minutes on a line 6¼ miles in length.

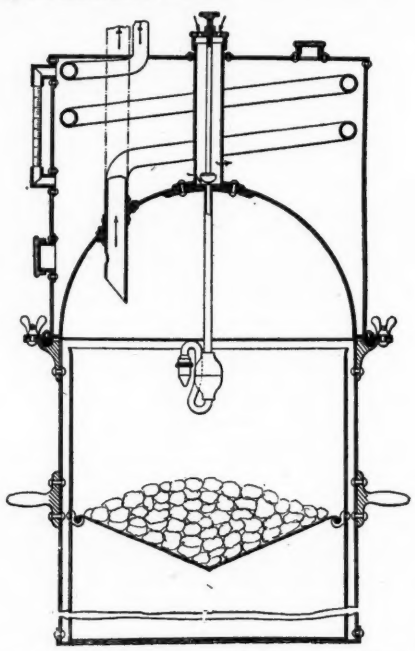
On Jan. 31 last, Herr H. Nachtsheim, the Editor of "Der Gastechniker," read a paper dealing with gas-motor cars at a meeting in Vienna of an association for the propagation of tramway traction. He gave a description of the cars now in use, and pointed out the advantages of the system of gas-traction. He stated that gas-motor tram cars were in use at Hirschberg, in Germany, and Maastricht, in Holland, in addition to the places already referred to above. The patent-rights of the gas-tramway system in Austria-Hungary were, he said, owned by the German Gas Tramway Company, of Dessau.

On July 14, 1896, we recorded the opening of the first section of the line of gas-driven tramcars between Blackpool and Lytham. At that time, owing to unavoidable circumstances, the line was not finished farther than St. Anne's-on-the-Sea. It has now been entirely completed. There is a charging-station at Lytham; and it is proposed to extend the line to the east end of the town. The undertaking is in the hands of the Gas Traction Company, whose system has been already described in our columns. It will shortly be introduced into Ipswich.

REGISTER OF PATENTS.

Generating Acetylene.—Villejean, E. G., and Frossard, H. J. J., of Paris. No. 2554; Jan. 30, 1897.

This is an apparatus for "the automatically regulated generation of acetylene gas at a constant pressure," consisting in the combination of a water reservoir directly superposed upon the gas-generating chamber containing the carbide, so that the water supply is warmed by the heat of the reaction and the condensation of aqueous vapour effected; the water and gas generating chambers being connected by a direct acting capillary regulator, whereby the water supply is so governed that the pressure of gas is maintained constant.



The generator shown as "more especially intended for use in lighting railway carriages and lighthouses," is constructed of two superposed containers, separated by a dome forming the bottom of the water reservoir, upon the under side of which the aqueous vapours formed become condensed—the water being thereby heated and prevented from freezing. The water is introduced at a filling orifice closed by a cap; and air is admitted through holes in it.

A charge of carbide having been placed in position, the water-chamber is filled with filtered water; and if the apparatus has not been before in use, the regulator is primed by unscrewing the capillary nozzle, and the water allowed to flow by raising the valve until the jet is of the full diameter of the tube and the ball floats. The nozzle is then screwed on, care being taken to see that the water trickles from it. The upper and lower parts are then connected, and water is allowed to run on to the carbide. On acetylene being generated, the internal pressure rises; and immediately it equals that of the column of water, the water is driven back, and the rubber ball rises, arrests the supply of water, and prevents the entrance of gas into the water chamber. As the pressure is diminished by the consumption of gas, the ball falls, and allows water to flow in; and so on.

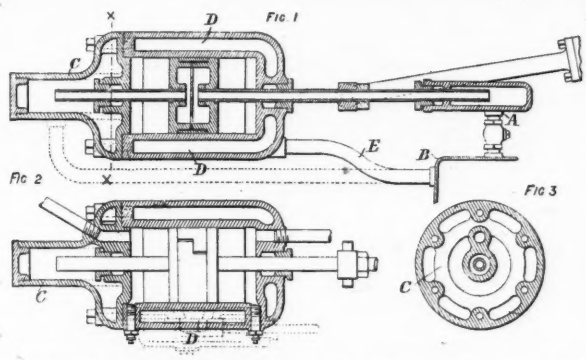
Automatically Producing Atmospheric Gas from Liquid Hydrocarbon.—Watson, P. B., of Falkirk. No. 2738; Feb. 2, 1897.

This invention consists primarily of a scrubber having within it a number of trays of perforated material, made so as to permit of the

thorough saturation of the absorbent material placed upon them. The hydrocarbon liquid is brought to the top of the scrubber, and runs in through a pipe. Air is passed through the scrubber from the lower end; and in its passage it takes up some of the vapour of the hydrocarbon liquid, and thus is gasified sufficiently to allow it to burn with either a heating or lighting flame. Suitable provision is made for the entrance and exit of the air, and for the admission of the hydrocarbon liquid. The air is passed in from a meter, which only works when the gas from the outlet of the scrubber is being used. The drum of the meter is made of the usual wet-meter pattern, but with a long spindle extending through stuffing-boxes on either or both sides of the case. On one end of the spindle is fixed a pulley, round which is coiled a rope or chain, the free end of which is carried over a pulley, and there has a weight attached, serving to revolve the drum of the meter. On the spindle is fixed a wheel, which revolves with the drum, carrying upon its periphery a series of cups or buckets, which lift up from a receptacle or tank a quantity of hydrocarbon liquid; and when they arrive near the upper part of their travel, they empty the liquid into a hopper, from the bottom of which the liquid is conveyed by gravity to the scrubber. The buckets are made of such a shape that, by setting them at varying angles, they can be made to lift any desired quantity of liquid, and also that they will lift the set quantity, independent of any variation in the quantity of liquid in the tank. When gas begins issuing, the power acting upon the spindle of the drum of the meter causes it to revolve, and thus draw in air from the atmosphere, or from the source of supply, if under pressure, and expel it through the scrubber in such quantity as is required; and, at the same time, the revolution of the spindle causes a similar revolution of the wheel carrying the cups or buckets, and thus the quantity of liquid raised and passed to the scrubber is constantly in accordance with the quantity of air being passed through, so that the quality of the gas is likewise constant.

Cooling Devices for Gas-Engines.—Maxim, H., of Norwood Road, S.E. No. 3025; Feb. 4, 1897.

This invention relates particularly (although not exclusively) to gas-engines, and especially to such engines as are double-acting. It has for its object the cooling of the working parts, by providing means for passing water into and through the piston-rod and piston of each cylinder of the engine, at the same time surrounding the cylinder itself with a jacket of water.



As shown, the piston-rod (preferably made hollow) extends beyond and through the crosshead of the engine, to a closed cylinder, into which it slides through a gland or stuffing-box. The cylinder is placed in communication by a pipe A with a tank or reservoir B. At the rear side of the piston, there is attached a hollow rod, extending through the cover of the cylinder to a separate chamber or receptacle C on the outside of the cover, and preferably made in one piece with the cover, so that there may be a free passage for water from C, through the rear piston-rod, through the piston, thence through the piston-rod proper to the chamber connected to the pipe A, and thence to the tank B.

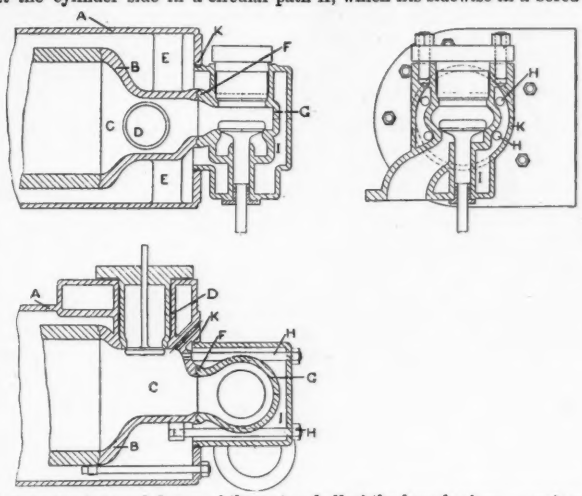
The chamber C is preferably connected by openings around the cylinder-cover to a water jacket D, around and in front of the cylinder, which is in turn connected by a pipe E with the other end of the cooling system. Thus, while the engine is working, and the piston is reciprocating, the water is forced by its friction on the reciprocating parts backwards and forwards through the system, as mentioned.

Internal Combustion Motors.—Crossley (the late), F. W., of Manchester No. 3370; Feb. 9, 1897.

This invention relates more particularly to internal combustion motors of considerable size; and it has mainly for its object the construction of the breech or closed end of the cylinder, so as to allow of greater freedom for unequal expansions—thus reducing strains which might otherwise be excessive. It comprises also an arrangement by which the exhaust-valve is placed in a separate piece, which can be changed at any time without disturbance of the rest of the engine, and having peculiar facilities for water-cooling.

A gas-engine of the "Otto" type is shown in the engraving—a sectional elevation of the engine cylinder, an end view partly in section, and a sectional plan.

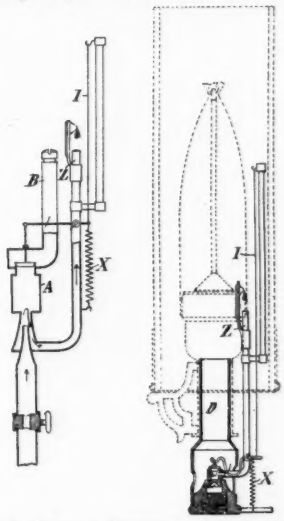
The breech-end of the cylinder mainly consists of an outer shell A and an inner shell B; the space between the shells forming a portion of the water-jacket. The space C inside the inner shell is the major portion of the "compression" space. The inner shell is attached to the outer shell by a branch connection D, through which the charges of air and gas enter, by the usual connections, and by means of ribs E suitably disposed. These connections and ribs are placed as close to the cylinder end as may be convenient. The outer end of the inner shell is coned or otherwise reduced to a smaller facing F, to which the exhaust-valve casing G is attached by means of bolts H, which pass from the inner shell close to the latter joint F to the outside of the exhaust-valve casing. This exhaust-valve casing is made with a water-space I, placed in free communication with the water-space of the breech-piece all round the joint F of the casing G; the outer metal of the valve-casing terminating at the cylinder side in a circular path K, which fits sidewise in a bored



hole in the internal flange of the outer shell of the breech-piece—a water-joint being made there by means of a ring of india-rubber in a recess in the circular path K, or by any other suitable method.

Self-Lighting Burner.—Franke, A., of Berlin. No. 3607; Feb. 10, 1897.

In the apparatus forming the subject of this invention, the device for controlling the gas supply to the igniting burner is entirely dispensed with; and, in order to automatically extinguish the igniting flame, the gas supply to the igniting burner is so connected to the gas supply to the main burner that the gas in flowing to the main burner produces an injector or suction action that prevents the further supply of gas to the igniting burner. Moreover the gas supply to the main burner is provided with an automatic shutting-off or controlling device, which opens the gas-inlet of the main burner as soon as the igniting flame is alight—operated by an expansible body situated within range of the igniting and principal flames, and expanded by the heat so as to open the controlling-device. So long as the principal flame is alight, the gas supply to it is kept open. If, however, the principal flame be extinguished, the controlling-device is closed, the inductive action ceases, and the gas can again flow into the supply-passage to the igniting burner, the flame from which will be again ignited, and will relight the principal flame.



In the engraving is shown a diagrammatic representation of a burner with igniting and extinction device made according to this invention; also a sectional elevation showing the improvements applied to an incandescent gas-burner.

The gas-supply pipe, controlled by a cock, discharges the gas through a nozzle extending into a suitably formed suction-chamber in communication with the valve-casing A of the burner, and normally closed at top by a valve. The rod of the valve is connected, through the medium of a lever, to a tightly-stretched metal wire I, which is mounted within thermal range of both the igniting burner Z and the main burner B; and the length of the wire is such that, when in its cold state, it keeps the valve closed. From the suction-chamber there branches a gas-pipe for supplying the igniting burner, while above the valve is connected the supply-pipe for the main burner B.

If, now, the supply-cock be opened, the gas flows into the chamber above the nozzle; and, since the valve above the chamber A is closed, it passes to the igniting burner Z in the direction of the arrow. The gas is then ignited at the burner Z in the usual manner; and the wire I is heated so that it yields and enables the spring X to open the valve above A. The latter opens slowly as the wire expands; and a small quantity of gas is allowed to pass to the main burner B. As soon as the gas has been lighted at B by the flame of the igniting burner Z, the wire I will be further heated, and the opening of the valve will be completed. The now strong suction action set up at the mouth of the nozzle prevents the passage of gas through the pipe leading to the burner Z, so that the

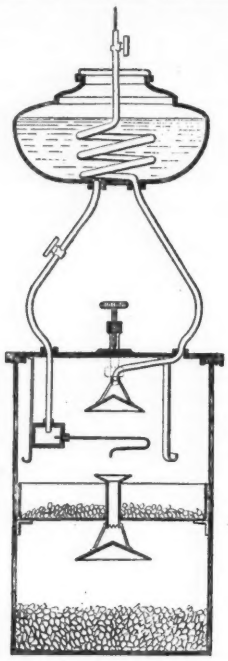
igniting flame is extinguished without any shutting-off device being required on the gas-supply pipe of the igniting burner.

A simplified construction can be employed when the device is used with an incandescent gas-burner. The nozzle usually arranged in the mixing-tube D of the burner is replaced by a nozzle as described. If then the valve above be made sufficiently large, it will answer perfectly if the nozzle simply opens into an expanded chamber from which the gas-supply pipe for the igniting burner extends laterally.

Producing and Burning Acetylene.—Gossart, E., and Chevallier, H., of Fampoux, France. No. 4424; Feb. 18, 1897. Date claimed under International Convention, Sept. 10, 1896.

This invention relates to certain arrangements, by means of which the patentees say they "have succeeded in improving or facilitating considerably the use of the apparatus described in patent No. 27,574 of 1896."

The claims for improvement in the generator shown are in respect of: 1. The "capillary auto-regulator," in which the carbide is distributed in several superposed layers, which are all attacked from above by falling water drops, and from below (with the exception of the under layer) by the water vapour carried by the acetylene; the generator being combined or not with a gasholder. 2. The water drops fall on a cone, which distributes them on the carbide. 3. Under the lower orifice of the gas escape tube



(this tube passing in a spiral in the water-receiver), there is arranged a cone serving for distributing on the carbide the water which is condensed thereon, especially in the part of the tube which is in the water-receiver. 4. The water which leaves the capillary tubes drop after drop falls into a funnel, whence it arrives on a cone, which distributes it on the carbide filling the bottom of the receiver, while the disengaged acetylene traverses a carbide layer before arriving at the escape tube. 5. The water-receiver is closed at its upper part by metallic gauze, which prevents the flame from spreading into its interior. 6. The walls of the carbide-receiver or gas-generator are coated interiorly with black cloth or felt, in order to avoid the condensation on their surface of the vapour of water in the interior, and thus obviate "the sudden and unforeseen fall of large water drops so formed which are sufficient to give violent bursts to the flame, especially when the lamp is shaken." The carbide receiver is surrounded with a double covering, open at the under and upper ends, for the purpose of creating an air current round the gas-generator.

Treating Acetylene to Facilitate its Combustion in Ordinary Burners.—Stattler, K., and Strejz, A., of Vienna. No. 4428; Feb. 18, 1897.

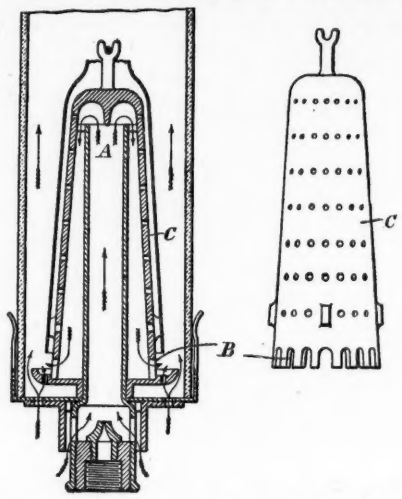
This invention relates (in the words of the patentees) "to a process for mixing the acetylene gas with pure, indifferent, not burning gases, in order to rarefy or dilute the acetylene gas so that it may burn in any burner with a brilliant flame without any smoke and soot. . . This rarefaction is produced by admixing to the carbide of calcium such substances from which produces successively carbonic acid."

The proposal is to mix with the carbide of calcium, calcium bitartaricum and tartrate of potash, or bicarbonate of soda and tartaric acid, or any other substances containing carbonic acid, from which carbonic acid is successively produced, and to which admixture water is added slowly. For 1 lb. of carbide of calcium, 2 grains of calcium bitartaricum and 2 grains of tartrate of potash, or 2 grains bicarbonate of soda and 2 grains of tartaric acid may be used—that is, 4 to 4½ grains of these substances for each pound of carbide of calcium. When tartaric acid is omitted, 4 grains of the other substances together—that is, 2 grains from the one, and 1 grain of each of the other ones—is the best proportion; but when tartaric acid is used and one of the other substances omitted, 1 to 1½ grains of each of the substances is best. When all substances are to be employed, 1 to 1½ grains of tartaric acid and 1 grain of each of the other substances is preferred.

Burners for Incandescent Gas Lighting.—Moeller, J., of 14, Palmer Street, Westminster. No. 7010; March 17, 1897.

This bunsen burner for incandescence gas lighting is so constructed that the mixture of gas and air which supplies the flame is highly heated before it burns.

As shown in the engraving, instead of lighting the flame at the top of the tube A (which the mixture of air and gas ascends in burners as usually constructed), there is placed over the tube a deep inverted cup C, of refractory material, so that the mixture is deflected at the top of the tube, and descending the annular space surrounding it towards the closed mouth of the cup at the bottom, issues by lateral orifices B, so as to form



an annular flame surrounding the cup. An incandescence mantle supported at the top of, and descending all round the cup, but separated from it by a small annular space, is heated by the annular flame produced. The refractory cup within the mantle, being also highly heated, imparts heat to the mixture of gas and air descending within it—"thus rendering the combustion more intense."

Stiffening Incandescence Mantles.—Schoder, R., of Streatham, S. W. No. 7330; March 20, 1897.

As a means of stiffening incandescence mantles so as to prevent damage by shocks during transport, the patentee proposes to employ pure paper pulp (such as that of which chemical filter paper is made), of a creamy consistence, by suspending it in water preferably having added to it a little less than 1 per cent. of nitric acid. Into this the skeleton mantle is dipped several times, so that when dried it has on it a stiffening coat of cellulose, but which, on igniting the mantle, burns off, leaving only the earthy skeleton. The pulp may, with advantage, be suspended in a volatile liquid (such as alcohol or ether) instead of water. In order to obtain greater stiffness of the prepared mantle, a little starch or gelatine may be added to the water, or a little lac to the alcohol in which the pulp is suspended. And, in order to obtain considerable strength combined with flexibility, besides the starch or gelatine, a little glycerine may be added. These substances, however, must be used in small quantity—say, 1 per cent. of the pulp solution.

Dry Gas-Meters.—Liddle, J.; a communication from the International Meter Company, of Chicago, U.S.A. No. 19,148; Aug. 19, 1897.

The primary object of this invention is to so construct the valve controlling mechanism of a dry gas-meter that the valves connected with it may be alternately actuated in opposite directions to open and close induction and eduction ports, communicating respectively with the opposite sides of the diaphragm; the action of the mechanism being such as to shift the valves instantly at the time when the diaphragm reaches its full limit of movement in a given direction. A further object is to so construct the valve-controlling mechanism that, when the valves are seated, they may be compressed firmly upon their respective seats by positive means (in addition to the pressure of the springs by which they are shifted), and there held securely until the instant of release. Also, to so construct the case and combine the valve mechanism with it, that the valves may be readily accessible for repair or adjustment, while the gas may be admitted directly to opposite sides of the diaphragm in lines substantially parallel with the plane of the diaphragm, instead of being forced through bye-passes cut through the diaphragm and curved passage-ways, which often complicate the construction and increase the cost of a dry meter.

Explosion Engines.—Weiss, C. W., and Mietz, A., of New York City. No. 24,096; Oct. 19, 1897.

One general object which the patentees have had in view is to improve the construction and operation of gas and oil engines so that "they shall respond more quickly to the action of the governor, and therefore be subject to less variation in speed while running," and incidental thereto they "have sought to improve the construction of the governor employed, so that it shall be and remain more sensitive in action than the ordinary governor, and shall not be so quickly affected by wear." They have also sought to guard against firing-back or ignition of the charge outside of the working cylinder or explosion chamber, and "to improve the character and ensure the uniformity of mixture of the explosive charge." Furthermore, as to gas-engines, the invention relates in part to the ignition of the charge, with a view to preventing ignition until the working piston has commenced its forward movement, and with a view to causing the ignition of the explosive charge to be effected simultaneously at different points, or over a wider area, so that the maximum of energy may be derived from the charge. They also provide means whereby the pressure of the air introduced to form a part of the explosive mixture shall itself effect the introduction of the gas, with the result that the amount of air introduced determines the amount of gas introduced for the same charge, and so ensures: (1) Uniformity in the relative proportions of air and gas of each charge, (2) that

the air and gas are brought together at substantially equal pressures, and (3) are mixed thoroughly as they pass on together into the working cylinder or explosion chamber. In this way a thorough and perfect mixture of the two is ensured, and all gas is removed from those parts of the engine where its presence might occasion firing-back.

APPLICATIONS FOR LETTERS PATENT.

3643.—Hopkins, E., "Generating acetylene gas." Feb. 14.
3661.—Walker, G., and Clement, A., "Automatically lighting, regulating, and extinguishing gas-lamps." Feb. 14.
3683-4.—Potter, W. G., "Burners for calcium and coal gas." Feb. 14.
3689.—Küchler, F., "Acetylene gas generators." Feb. 14.
3707.—Fraser, J., "Gas and oil lamps." Feb. 14.
3716.—Crosta, L. W., and Taylor and Sons, J., Ltd., "Silencer for the exhaust of gas and like motors." Feb. 15.
3722.—Bailey, C. J., and Nicklin, J. H., "Generating acetylene gas." Feb. 15.
3738.—Wynn, J., "Gas-brackets." Feb. 15.
3745.—Ross, J. H., "Acetylene gas generator." Feb. 15.
3770.—Plaissetty, A. M., "Mantles for incandescent gas and other lighting." Feb. 15.
3799.—The Automatic Universal Gas Lighter, Ltd., "Automatic gas-igniting arrangements." A communication from J. F. C. Jürgen. Feb. 15.
3834.—Miller, L. M., "Manufacture of acetylene gas." Feb. 16.
3914.—Etaix, L., "Purification of acetylene gas." Feb. 16.
3915.—Featherstonhaugh, J. F. W., "Gas-lighting and accessory apparatus." Feb. 16.
3927.—Jameson, F. W., "Burner for incandescent mantles." Feb. 16.
3982.—Black, D., Brown, R., and Wright, J. M'L., "Forming pipes, gas-retorts, and the like." Feb. 17.
3992.—Boult, A. J., "Carburetters for internal combustion engines." A communication from La Société Nouvelle des Établissements Décauville Ainé. Feb. 17.
3993.—Boult, A. J., "Electric ignition devices for internal combustion engines." A communication from La Société Nouvelle des Établissements Décauville Ainé. Feb. 17.
4074.—Clitheroe, A. J., "Generation of acetylene gas." Feb. 18.
4101.—Dupont-Helbach, J. B., "Gas-motors." Feb. 18.
4103.—Arson, L. F. A., "Dip-valves for gas-retorts." Feb. 18.
4113.—Berger, H., "Generating acetylene." Feb. 18.
4122.—Lehrner, E., "Fluid meters." Feb. 18.
4129.—Coulson, W. A., and Thiersant, H. de, "Generation of acetylene gas." Feb. 18.
4140.—Child, T., "Starter for gas or oil engines." Feb. 18.
4160.—Reid, A., "Portable gas-stoves." Feb. 19.
4194.—Wolpert, H., "Air carburetting apparatus." Feb. 19.
4213.—Rümelin, L., and Auer, H., "Acetylene generators." Feb. 19.
4239.—Freestone, F., "Air-valve for gas and oil engines." Feb. 21.
4255.—Wilson, C. F., "Gas or other motor engines." Feb. 21.
4344.—Oddy, H. O., "Acetylene generators." Feb. 22.
4352.—Walker, H., "Production and purification of acetylene gas." Feb. 22.
4359.—Dant, H., "Generating acetylene gas." Feb. 22.
4372.—Ross, J. H., "Acetylene gas generator." Feb. 22.
4392.—Holden, H. C. L., "Gas and other engines." Feb. 22.
4404.—Smith, M. H., "Ignition-tubes for oil or gas engines." Feb. 22.
4410.—Farmer, W. J., and Somerville, J. M., "Extraction of cyanogen compounds from coal and coke-oven gas." Feb. 22.
4413.—Graham, M., "Feeding elevators and conveying machinery." Feb. 22.
4414.—Witham, W. H., "Distributing and modifying the light of oil, gas, and electric lamps or burners." Feb. 22.
4446.—Justice, P. M., "Manufacture and treatment of acetylene gas." A communication from the Allgemeine Carbid-und Acetylen-Gesellschaft, mit beschränkter Haftung. Feb. 22.
4459.—Rümelin, L., and Auer, H., "Receptacle for the storage of calcium carbide." Feb. 22.
4461.—Graham, H. B., and Blumfield, T. W., "Water-cooling tanks for use with internal combustion engines." Feb. 22.
4531.—Richmond, E. W. T. "Gas-meters." Feb. 23.
4563.—Brightmore, A. W., "Internal combustion engines." Feb. 24.
4608.—Forster, W. G., "Extraction of cyanogen compounds in the manufacture of coal gas." Feb. 24.
4645.—Renouf, P. L., and Accles, J. G., "Ignition of gas or oil engines." Feb. 25.
4653.—Clayton, R., and Ward, T., "Gas-heated ovens." Feb. 25.
4679.—Scarth, J. E., and Thornton, W. A., "Lamps for generating and burning acetylene gas." Feb. 25.
4688.—Hawes, M. H., "Gas brackets and chandeliers." Feb. 25.
4717.—Mitchell, E. A., "Generating, storing, and enriching hydrogen gas." Feb. 25.
4720.—Mitchell, E. A., "Regulating valve apparatus for gas generators." Feb. 25.
4722.—Glover, R. T. & J. G., "Price-changers for coin-freed gas and like fluid meters." Feb. 25.
4739.—Scheidt, B. von, "Generating acetylene gas." Feb. 25.
4743.—Leigh, H. H., "Gas and petroleum motors." A communication from B. J. X. Gosselin. Feb. 25.
4759.—Barr, J., and M'Whirter, W., "Indicating and recording at a distance changes of level or position of water or other fluid in reservoirs, gasholders, or other structures." Feb. 26.
4801.—Moss, R. J., "Acetylene gas generators." Feb. 26.
4809.—Lamplough, F., "Gas-making apparatus." Feb. 26.
4816.—Lyon, A. J., and Whitmore, G. F., "Igniting apparatus for gas-engines." Feb. 26.

Additional Water Supply for Coleraine.—Last Wednesday, Mr. C. P. Cotton, the Chief Engineering Inspector of the Local Government Board, held an inquiry at Coleraine, concerning an application by the Town Commissioners for sanction to a loan of £5000 for the purpose of providing an additional water supply. There was no opposition.

CORRESPONDENCE.

[*We are not responsible for the opinions expressed by correspondents.*]

The Meeting of the Incorporated Gas Institute.

Sir,—I shall be much obliged if you will kindly insert in your next issue the accompanying announcement.

13, *Victoria Street, S.W.*,
March 4, 1898.

Walter T. Dunn, Secretary,
The Incorporated Gas Institute.

[Enclosure.]

Since the date of The Gas Institute meeting was fixed, the Council have received an intimation from the Dutch Association of Gas Engineers that they purpose visiting England in the second week of June, when they are to be the guests of the Institution of Gas Engineers. It has therefore been decided that The Gas Institute meeting be held June 21 to 24—a week later than originally intended—so as to suit the convenience of those who are members of both societies, and also to afford the opportunity, to any of the visitors who may feel so disposed, to attend The Gas Institute meeting at Belfast.

The Trade in Alizarine—The Conversion of Gas Companies' Capital.

Sir,—In reply to Mr. James, let me say that, in referring to Messrs. Simpson, Maule, and Nicholson, I was speaking of the tar-colour industry, and not (at that point of my speech) of alizarine or of anthracene. I know perfectly well that the firm named made their fortunes out of aniline, and that they retired before the day of anthracene. I certainly did not assume that the "tar colours, to be of the proper quality, and to be manufactured economically, must be 'made in Germany.'" All that I want is that the makers of tar should get something near the value of the article, which at present is certainly not the case.

Having pen in hand, I may deal with another and different matter—viz., the speech of the Chairman of the Parliamentary Committee of the London County Council, on the next page of last week's "Journal," where it is stated that the Comptroller of the Council had estimated that the conversion of the South Metropolitan Company's stock would increase its value by £250,000, and that I had estimated the increase at only £90,000, "but the actual effect had been an increase in capital values of £900,000." This figure really understates the fact; but the inference drawn is quite wrong, as the following figures will show.

The South Metropolitan Bill was first introduced in the session of 1895. I therefore take the market value of the ordinary stocks of the Company on Dec. 31, 1894. I need not give details, but the totals are as follows:—

		Market Value.
Dec. 31, 1894.	"A," "B," and "C" stocks	£6,430,000
Dec. 31, 1897.	The same converted	7,757,500
	Increase	£1,327,500

or 20 per cent.

Compare this with the ordinary "A" stock of The Gaslight and Coke Company, over the same period, which has not been converted—

		Market Value.
Dec. 31, 1894.	"A" Ordinary stock at 254	£14,342,338
Dec. 31, 1897.	The same stock at 315	17,786,758
	Increase	£3,444,420

or 24 per cent.

Of course, the conversion increased the value of the South Metropolitan stock to some extent; but how much, no man could guess beforehand, nor say afterwards. But the fact that an unconverted stock increased 24 per cent. in value, while the converted stock increased only 20 per cent., proves that other and unknown factors influenced the prices. Gaslight and Coke stock has gone down considerably since the end of last year; but this is due to other and well-known reasons.

I send this statement because a very erroneous and exaggerated idea of the effect of conversion is in danger of being formed, which may do mischief.

March 5, 1898.

George Livesey.

The Cost of Hand and Machine Stoking at East Greenwich.

Sir,—In the address of the President of the Midland Association of Gas Managers, reproduced in your last issue, allusion is made to the cost of carbonizing by machinery at East Greenwich; and some figures are given which are not quite in accordance with the facts.

Mr. Lewis has quoted from a paper read by me in 1894, making it appear that the total cost of carbonizing at these works by hand was 26·3d., and with Foulis's hydraulic machines 12·5d. per ton. He, however, omits to add a further statement of mine to the effect that these figures do not include all retort-house labour; it being necessary to add about 6d. per ton for labour common to both systems, made up of firemen, engine and boiler attendants, foreman, &c., which would bring the total cost to 32·3d. for hand work, and 18·5d. for machine work.

I do not know whence Mr. Lewis obtained his figures for the working of West's machines at East Greenwich. They are quite wrong; and it should not be allowed to go forth that carbonizing by machinery can be done for so low a figure as 9d. per ton, as it might unnecessarily alarm some engineers who are spending large sums of money on inclined-retort installations.

In order that there should be no misunderstanding, I give the figures derived from a recent half-year's working:—

	Hand Work.	Foulis-Arrol Machines.	West's Machines.
Coals carbonized	21,830 tons.	58,000 tons.	49,000 tons.
Total cost per ton	2s. 10d.	1s. 9·4d.	1s. 7·8d.

The above figures comprise all carbonizing charges, and in the case of machinery also include wear and tear and maintenance, and 5 per cent. interest on the cost of the machines.

East Greenwich, March 2, 1898.

J. Tysoe.

The Rejection of the Wymondham Water Bill on Second Reading.

SIR,—I think the attention of engineers and others concerned in the promotion of water-works companies should be drawn to the very exceptional circumstances under which the Wymondham Water Bill was thrown out yesterday on second reading.

This Bill had, as is so often the case, incurred the most strenuous and determined opposition on the part of the principal Local Authorities concerned—viz., the Wymondham Parish Council and the Forehoe Rural District Council. The latter body drew up a petition against the Bill which would have been of very little weight if considered in Committee, for the principal statements it made would have been directly denied by the Medical Officer and other local officials. The interest of the case, however, lies in the fact that the local Member of Parliament was induced to oppose the Bill on second reading—a most unusual proceeding in the case of local Private Bills of this nature. The Chairman of Ways and Means (Mr. J. W. Lowther) himself stated that he could see no grounds for opposing at this stage; and every effort was made to induce the member to abandon his opposition until the Committee stage. This, however, he refused to do; and, the promoters being unprepared to defend their cause adequately (as regards numbers) in the House, the Bill was thrown out.

It is indeed a serious matter if promoters of Bills are to be obliged to prepare their case, and obtain a hearing in the House itself at the second reading stage as well as in Committee. Moreover, it is obviously contrary to the principles of Private Bill procedure that this should be the case. The contention that by this process the ratepayers are saved the expense of opposition in Committee is hardly a good example of that justice and fair play which is so scrupulously observed in our parliamentary proceedings. Surely no promoters would incur the expense of proceeding up to this stage were they not advised that they had a good case; and why should their outlay be thrown away because local authorities, on the weakest possible grounds, determine to oppose their Bill? If this is to become a precedent, it will be a serious blow to private enterprise in the direction of water undertakings.

I trust engineers and others concerned in these matters will use their utmost endeavours to prevent the recurrence of this most objectionable precedent.

PERCY GRIFFITH, Assoc.M.Inst.C.E., F.G.S.

55, *Parliament Street, S.W., March* 2, 1898.

O'Connor's "Gas Engineer's Pocket-Book."

SIR,—I noticed the paragraph in the "JOURNAL" recently on the above, so bought a copy at once; and I should very much like to draw the attention of gas engineers and Mr. O'Connor to the following extracts:—

Page 145.—"Coke diminishes in weight by exposure to the weather."

" 232.—"When large stocks of coke are stored in the open an increase in weight of 15 to 20 per cent., due to wet weather, has at times been found."

" 265.—"$NH_4OCO_2 = NH_3 + HO + CO_2$
$NH_4S = NH_3 + HS$."

" 270.—"About 40 lbs. of lime are required to purify a ton of coals."

" 272.—"About 70 lbs. quicklime are required per ton of coal."

These are a few notes which attracted my attention. There may be more of the kind or not; but after finding these I stopped reading, for fear the book might get burnt.

YOUNGSTER.

March 3, 1898.

PARLIAMENTARY INTELLIGENCE.

HOUSE OF LORDS.

The following further progress has been made with Bills:—

Bills read a second time: Forres Water Bill, Liskeard Corporation Water Bill, Newcastle and Gateshead Water Bill.

Bills committed: Bakewell Gas Bill, Sheringham Gas and Water Bill.

The Edinburgh and District Water Bill, the Edinburgh and Leith Corporations Gas Bill, and the Stirling Gas Bill have been referred to a Select Committee, consisting of the Duke of Richmond (Chairman), the Earl of Stamford, the Earl of Carlisle, the Earl of Lucan, and Lord Wenlock; to meet on Tuesday, March 15.

The Standing Orders Committee have reported on the reference to them of the Newhaven and Seaford Water Board Bill and the Filey Water and Gas Bill, on the ground of non-compliance with Standing Orders. In the case of the former Bill, they reported that the Orders ought not to be dispensed with; but that in the case of the latter they might be, provided the portion of clause 22 relating to the charge for water supplied to houses of which the rateable value is £5 and under £10 per annum, is struck out.

Petitions have been presented against the following Bills: Bacup Corporation Water Bill, Bury Corporation Bill, Carlisle Corporation Water Bill, Edinburgh and District Water Bill, Folkestone Corporation Water Bill, Folkestone Gas Bill, Folkestone Water Bill, Halifax Corporation Bill, Hamilton Water Bill, Heywood Corporation Water Bill, Liskeard Corporation Water Bill, Morley Corporation Gas Bill, Morley Gas Bill, Newcastle and Gateshead Water Bill, Newhaven and Seaford Water Bill, Redhill and Reigate Gas Bill, Rochdale Corporation Water Bill, Stirling Gas Bill, Swansea Gas Bill, Todmorden Corporation Water Bill, Tynemouth Corporation Water Bill, Wath-upon-Dearne Urban District Council Bill, Waterford City Gas Bill, Yeovil Corporation Bill, Yoevil Gas Bill.

HOUSE OF COMMONS.

Tuesday, March 1.

WYMONDHAM WATER BILL.

On the order for the second reading of this Bill,

Mr. F. W. WILSON moved the rejection of the measure, on the ground that it was an attempt on the part of private capitalists to get possession of a water area in Norfolk against the wishes, and even remonstrances, of all the Local Authorities in the district. These bodies were, he said, as able and as willing as the promoters of the Bill to provide a proper supply of water; and he insisted that it should be left in their hands. He based his opposition to the Bill on the broad principle that the supply of water rightly belonged to local authorities; and where they were willing to undertake it, it should not be handed over to a private company. As the House had extended local government to country districts, he considered that what had been given by one hand should not be taken away by the other; and he therefore appealed to the House, in the interest of local government, not to pass the second reading of the Bill.

Mr. A. E. FELLOWES seconded the motion. He remarked that he had lived in the Wymondham district all his life. The opposition of the Local Authorities to the Bill had been confirmed by meetings of the inhabitants. There was not a single East Anglian member who would vote for the measure. A house-to-house visitation showed that the water supply was, on the whole, already good and abundant. But any defects there might be would be remedied by the Local Authorities; and the water supply should be left to them.

Mr. H. C. RICHARDS said that, though his name was, with others, on the back of the Bill, he had no pecuniary interest in it. It was right, however, that the House should know that in 1894 and 1896 outbreaks of enteric fever in the district covered by the Bill were reported to the Local Government Board. The promoters of the Bill had already offered to insert a clause, which had been submitted to the Speaker's Counsel, giving to the Local Authority purchasing powers. Therefore everything had been done to meet their objections. The Local Authority had not stated to the Local Government Board, or to those in charge of the Bill, that they were prepared to bring in a Bill themselves; and he thought it should weigh with the House that the Board were prepared to show that the Local Authority had done nothing with regard to the water supply.

Mr. D. FORD GODDARD said he thought the Bill should be rejected on the grounds that the promoters did not attempt to give a constant supply, and that the proposed charges were high. With regard to the purchase clause, when it came into effect, what would be the price the Local Authority would have to pay for the undertaking? The Ipswich Corporation many years ago disposed of their water rights to a private Company, and he need not say the Company flourished very well indeed. But in 1867, when the Corporation proposed to buy back these rights, the price asked was £100,000. This was thought too high. When they moved in the matter in 1887, the price was £170,000; and when he raised the question again in the Ipswich Corporation, the price asked was £213,000. Ultimately, the undertaking was purchased for £200,000; and the effect to the ratepayers during the past two years had been that it supplied £1000 a year in relief of the rates. If the Local Authority in the present case parted with their rights, it was perfectly certain that whenever they wanted to purchase them back the ratepayers would have to pay dearly for them. He thought the Local Government Board should have a word to say on this question. As the Local Authorities were all agreed in their opposition to the Bill, he should support the motion for its rejection.

Mr. J. W. LOWTHER (the Chairman of Committees) did not deny that there were many points in the Bill which might be altered; but, having in view the fact that the local Medical Officer of Health had more than once called attention to the lamentable defects in the water supply of the district, and knowing how serious outbreaks of disease had, at Maidstone and elsewhere, been traced to improper water supply, he urged the House to give the Bill a second reading, and send it to a Select Committee. The promoters had, in his presence, offered to insert any reasonable clause for purchase which the opponents proposed.

Mr. S. HOARE expressed a strong opinion that there were matters in the Bill upon which the House should exercise its judgment. To pass the Bill would be to concede to four gentlemen from London control for five years over the arrangements for supplying water to Wymondham and sixteen villages scattered around; thus overriding the Local Authority.

After a few remarks from Mr. T. P. O'CONNOR and Sir W. FOSTER in favour of the rejection of the Bill, the motion for the second reading was negatived without a division.

The following further progress has been made with Bills:—

Bill presented and read the first time: Wigan Corporation Bill.

Bills read a second time and committed: Brompton, &c., Water Bill, Cranbrook District Water Bill, Enfield Gas Bill, Hartlepool Gas and Water Bill, Higham and Hundred of Hoo Water Bill, Ilford Improvement Bill, Malton Water Bill, Norwich City Water Bill, St. Anne's-on-the-Sea Gas Bill, Southend-on-Sea Gas Bill, Southampton Gas Bill, Thanet Gas Bill, Tottenham and Edmonton Gas Bill, Whitwick and Coalville Gas Bill, York Gas Bill.

Petitions have been presented against the East Ham Improvement Bill and the Wigan Corporation Bill.

The second reading of The Gaslight and Coke Company Bill, set down for the 28th ult., has been postponed till Thursday next.

Questionable Advice to Gas Consumers.—A correspondent has called our attention to an instance of the readiness of people to give advice on subjects on which they are but imperfectly informed. Among the recipes contained in the almanac for the present year issued by a much advertised firm of soap makers, is one for preventing the freezing of gas-meters. Of course, the consumer is advised to use the firm's glycerine; and an illustration is given to show how it is to be put into the meter. But, unfortunately, the meter happens to be a dry one.

Gas "Boycotted" in the Blackburn Out-Districts.—There has been a little contest between the Blackburn Corporation Gas Committee and the consumers in the out-districts of Livesey and Pleasington regarding the higher price the latter have to pay for gas than the consumers in the borough. The difference is 6d. per 1000 cubic feet; and, in order to get a concession, they took the extreme, but to some extent effectual, course of "boycotting" the gas. The Gas Committee have since had interviews with the Parish Councils, with the result that a compromise has been effected by the Committee agreeing to supply gas for public lighting and for cooking and motive power at the same price as is charged to consumers in the borough.

LEGAL INTELLIGENCE.

HIGH COURT OF JUSTICE—CHANCERY DIVISION.

Wednesday, March 2.

(*Before Mr. Justice* WRIGHT.)

The Distribution of the Assets of the Driffield Gaslight Company.

It will doubtless be in the recollection of most readers that on the 16th ult. (*ante*, p. 410) application was made to the Court to determine how a sum of about £5000 should be applied as between the shareholders in the above-named Company, which was in voluntary liquidation. After hearing the arguments, his Lordship reserved judgment, which he delivered to-day.

Justice WRIGHT said the Company was constituted in 1835 under a Deed of Settlement; and it seemed to have been registered under one of the old Joint-Stock Companies Acts, and also under Part VII. of the Act of 1862, as a Company without limitation of liability. The Deed of Settlement provided that the sums set opposite the names of certain parties should form the capital of the Company, and that the aggregate amount should be £1800. It also provided for increasing the capital by the issue of further shares; that losses should be made good by the proprietors in proportion to their respective holdings; that profits should be divided according to the amount of the shares; and that, upon winding up, the residue (after payment of the debts) should be allocated between the several proprietors for the time being in proportion to their respective shares in the undertaking. The capital was in £10 shares. Before the date of the winding up, it had been increased by the issue of 1200 shares, some of which were, and others were not, fully paid up. The owners of the new shares were to be entitled to dividends on the amounts from time to time called up. In 1897, the undertaking was sold to the Local Authority; and the question for determination was: On what principle were the surplus assets to be distributed. He had come to the conclusion that the capital account must first of all be equalized by a return of all the capital paid, and that the balance must be divided between the several proprietors for the time being in proportion to their respective shares in the undertaking—that was to say, in proportion to the nominal amount of the shares. He was quite unable to accede to the suggestion that those who took shares at a premium should receive back the premium.

SOUTHAMPTON QUARTER SESSIONS—Monday, Feb. 23.

(*Before the Recorder, Mr.* E. U. BULLEN.)

The Assessment of the Southampton Gas Company's Works.

This was an appeal by the Southampton Gas Company against the assessment of their property by the Southampton Guardians.

Mr. LITTLER, Q.C., Mr. RYDE, and Mr. LAMPARD appeared for the appellants; Mr. BALFOUR BROWNE, Q.C., Mr. CHARLES MATHEWS, and Mr. BARNES for the respondents.

Mr. LITTLER, in opening the case, said the Company appealed against the assessment of their property for all parishes within the borough. He was glad to say they had arranged, although perhaps in some respects it was an arrangement in favour of the parishes, that the Recorder should only be troubled in ascertaining what was the total gross rateable value in the borough; and the arrangement between the parishes would be carried out hereafter without troubling the Recorder, otherwise he would have had to try six appeals on the same subject-matter. The totals were: Gross rateable value, £12,724; and net, £9118. The Company had been paying very heavily in respect of the relief of the poor for some years; and he dared say it might be urged on the other side (he saw it had been suggested in correspondence) that they could not have had a very great grievance, inasmuch as they had not before appealed. People went on submitting until at last something arose which induced them to resist, because trying these appeals was very troublesome and expensive. For a long time, although they felt unfairly assessed, the Company did not resist; but on looking into the matter, they found that, so far from the assessment being increased, it should be reduced. The Corporation had the electric light in their own hands, and had become serious competitors with the Company. Their energy had had a considerable effect on the rateable capacity of the Gas Company; and the result had been a very considerable diminution in their—he would not say gross returns, but in their progress. It would be found that in the first year after the electric light was acquired by the Corporation, there was a diminution in the quantity of coal carbonized to the extent of 1000 tons; and, although they were able to charge 4s. 6d. per 1000 cubic feet of gas in the borough and 5s. outside, they had been obliged to lower the price from 3s. 1d. to 2s. 7½d., which was considerable. This reduced their profits to such an extent that in 1896 they were as low as £15,926, although it took £18,761 to pay the debenture interest and the statutory dividend. It was a fact that since 1891, the year when the electric light was first introduced by a Company, the Gas Company had not been able to make sufficient profit to pay the statutory dividend, except in one year. They had had to draw on their reserve, hoping the time would come when they would renew their prosperity, and earn as much or more than the statutory dividend, so as to replenish the reserve. In addition, since 1890 the rates had gone up from 6s. 8d. in the pound to 7s. 6d. As the Company were very large ratepayers, this again was a matter which was very serious for them, and made it more necessary that they should ask to be assessed on some more modern computation than that now adopted by the poor-law authorities. The matter had been very carefully gone into since 1875; and it appeared to the Company that the time had come when there should be a very large reduction indeed from the present amount of rates. He should have to go into a considerable amount of details; and he regretted that the public authorities did not agree with the view that it would be better to refer the matter to arbitration. Counsel proceeded to deal with the figures, in getting out which he said they had adopted the usual course—they had found the gross receipt, and then deducted from it the working expenses. He might mention first of all the expense of coal, which was now dearer than it was; and 1s. on the price of a ton made a difference of £1900 a year. Again, unfortunately, although coal was dearer, the residuals, such as tar and sulphate of ammonia, were almost as low as they had been in recent years. Taking all expenses, salaries, wages, repairs of meters and stoves, lighting and repairing lamps, and making all the statutable deductions, instead of bringing the rateable value to £9000 in the borough, they brought it out at a little over £5000, which was a very considerable reduction.

The RECORDER: Would you mind giving me the prior assessment?

Mr. BALFOUR BROWNE: £11,010 gross, and £6790 rateable.

Mr. LITTLER: And now the rateable value has been increased to £9118.

Mr. *C. C. Smith*, Secretary of the Company, examined by Mr. RYDE, produced receipts for the second instalment of the rate appealed against; and it was admitted that the amounts had been paid. He produced the audited accounts of the Company for the two half years of 1896, and said they had been furnished to the respondents. He also produced certain correspondence and a return showing the receipts of the Company in each individual parish in the two half years.

In cross-examination by Mr. BALFOUR BROWNE, witness said he had been Secretary to the Company for 32 years. The works were re-valued in 1893. Mr. Marshall was the valuer at that time; and there was then no appeal. It was upon that valuation that these figures had been put at £6790 rateable value; and upon this they had been paying. The Directors of the Company, knowing the enormous expense of the previous appeal (£4000), rather put up with the increase than appeal again. The dividends of the Company were limited to 10, 7, and 5 per cent.; and the maximum had been paid by using the unappropriated balance and the reserve fund, which were derived from the sale of gas in more prosperous days. The Company were promoting a Bill in Parliament for various powers. They were going to try and induce Parliament to extend their limits; and the amount of capital they sought to raise was £200,000.

Mr. BALFOUR BROWNE: You must be in a flourishing condition.

Witness said their object was to become flourishing by getting more business. Replying to further questions, he said investors only obtained 4 per cent.; and the shares were held in the same way as good investments generally were. They had been losing a great many customers in consequence of the electric light—160 at least. Since the introduction of the electric light, more coal had been carbonized; but the receipts had been reduced from 7s. 5d. per ton carbonized in 1893 to 6s. 8d. in 1896. Although there had been an increase of £46,000 in the capital since 1893, they were not making so much profit owing to the loss on residuals.

Mr. *Marshall* stated that he valued the gas-works for the Guardians in 1893 on the accounts of the year 1892; and he adopted the same principle then as he did now. The capital value of the lands and works was £124,000; offices, £4000; and mains and services, £87,400—making the total capital of the entire undertaking £215,400. The net rateable value of that part within the Recorder's jurisdiction was £5351; and the gross, £9118. In 1892, the works were capable of carbonizing 33,000 tons of coal; and the actual quantity carbonized was 30,209 tons. In 1896, the works had been so extended that they were capable of carbonizing 50,000 tons, and actually carbonized 37,939. Though the percentage was much lower, the works had to be kept in repair as though they were working up to the full capacity. He based his valuation on the actual profit earned in 1892, and adopted exactly the same principle this time.

Mr. BALFOUR BROWNE, referring to the mass of figures before him, said it was almost impossible to deal with them except over the table in arbitration; and he was sorry the respondents were to blame for not adopting this course in the first instance.

In cross-examination, witness said the Company could not have done more than pay the maximum dividend. The receipts in 1896 amounted to £1000 more; but the expenses had increased by £3000.

Mr. BALFOUR BROWNE said he had spoken of the difficulty of dealing with the case before this tribunal; and he understood at an earlier period the suggestion had been made that the matter should be referred to arbitration, which at one time his clients did not see their way to accept. But on his advice, and that of his learned friend, the matter should be referred, though it could not be referred to anybody except the Recorder. They would, therefore, ask him to hear the continuance of the case at any time convenient to him. He had suggested to his friend whether, as the case could not be concluded on the following day, he would not prefer to have an adjournment that night. What he proposed was to enter into an agreement before the next sitting that the whole matter should be treated as a reference.

Mr. LITTLER stated that he saw from the beginning what must be the ultimate end; and the appellants had done all they could to get this step taken. He was in the difficulty that he had his witnesses present at great expense. He could foresee that if Mr. Balfour Browne commenced his case he would not get far into it. The only terms on which he could consent to arbitration were to dispose of his two witnesses.

Mr. BALFOUR BROWNE said he would not resist that if convenient.

The RECORDER remarked that he could not impose terms on either party. He was prepared to sit; and it must be a matter of arrangement between themselves.

Mr. LITTLER said if Mr. Balfour Browne would accept his proposal, he would advise his clients to adhere to their original suggestion, because it would be much more convenient to take it before the Recorder in a room where they could discuss it without the formalities of the Court.

Tuesday, March 1.

At the commencement of the proceedings this morning,

Mr. LITTLER asked to be supplied with a copy of the summary of the respondents' figures, so that they might see where they differed; and it would also lighten the Recorder's duty.

Mr. MATHEWS said that no summary of the kind suggested was given to the respondents before Mr. Marshall went into the box. They were then handed 31 pages of figures, which they were supposed to digest at sight. After being put to such a disadvantage, it is very unfair that, now their case had been part heard, they should be put to the extreme disadvantage of furnishing their figures to the other side.

The RECORDER said, as far as his experience went, his view was that both parties when they came into Court ought to exchange figures.

Mr. LITTLER remarked that they were pressed for time; but it would have been better to have exchanged before.

The RECORDER said he did not see why the figures should not be exchanged now. As the case proceeded, if Mr. Mathews wished to alter the figures, he would then be able to do so.

After a few further remarks, the learned Counsel exchanged figures.

Mr. *Marshall* (recalled for re-examination) said the total gross receipts in 1892 were £61,172, and £68,134 in 1896. The expenses, less rates and repairs, were £36,531 in 1892, as compared with £45,397 in 1896. The expenses had increased by nearly £9000; while the total receipts had only advanced by £7000. This was the reverse of what they usually found. The net receipts were £22,800 in 1896, against £24,600 in 1892; and the working capital had increased by £5000—from £39,000 to £44,000. The working capital was very reasonable; and he did not see how there could be any extravagance in connection with the Company's working.

Mr. *Ryde* was next called; but before his examination had proceeded far, there was a consultation between Counsel, after which

Mr. MATHEWS said as the figures had been interchanged since they had come into Court, it was quite obvious that even the most skilful would require some time to digest them. It was late in the day when the interchange had taken place, and not favourable to the respondents. It was a reasonable point at which the figures should be considered. It seemed to him that much time would be saved by the investigation of the figures by specialists; and the examination and cross-examination might be curtailed by the figures. The respondents, owing to the unexpected compulsory absence of Mr. Balfour Browne, were placed at a disadvantage. He thought he had said enough to show that, at the end of the evidence-in-chief, he should have abundant reason to apply for the cross-examination to be postponed.

Mr. LITTLER said he should have no objection. He did not wish to put the respondents in any difficulty or to put them to unnecessary expense. The appellants had no desire to catch the town authorities in doing their duty, or to have anything but a fair conclusion to the case. But, on the other hand, he would remind the Recorder that they had been put to enormous expense by the course the respondents had thought fit to adopt. This, however, was a matter for hereafter; but in the meantime he did not desire that there should be even the semblance of grievance on the part of the public authorities as to the course they adopted.

Mr. MATHEWS: Then this is to be taken by consent as an arbitration from yesterday morning.

The RECORDER: Very well.

Mr. LITTLER: All power of costs will be vested in you without consent.

The RECORDER: The appeal in the 1877 case decided all these points.

The Court was then adjourned for a fortnight; and in the meantime the reference is to be drawn up.

GUISBOROUGH QUARTER SESSIONS.—Tuesday, March 1.

(*Before Mr.* R. C. YEOMAN *and other Magistrates.*)

The Assessment of the Cleveland Gas Company's Works.

This was an appeal by the Cleveland Gas Company against the assessments of their works and mains in the parishes of Loftus, Skelton, Kilton, and Stanghow.

Mr. HARDY represented the appellants; Mr. RICHARDSON appeared for the respondents—the Guisborough Union Assessment Committee.

Mr. HARDY, in opening the case, said the present rateable value was based on a valuation made in 1896 by Messrs. Hedley and Sons, which showed an increase on 1895. The rateable value was then fixed at £290; and it was now sought to put it at £429. This being quite out of proportion, the Company wanted to have the real rateable value fixed. The question had never been fought out; and the attention of the Company had never been called to the matter until last year, when they appealed against the amount that had been fixed by the Assessment Committee. They then obtained a slight deduction; and this year his clients felt fully justified in taking proceedings to have the assessment reduced. Their profits in 1895 were £539; and the rateable value of the property was then fixed at £290. The profits in 1896 were £670; and the rateable value was then £429. If the ratio of the profits and the amount assessed were taken, it would be found that, instead of being assessed at £429, £361 would be in the same ratio as the £290 fixed in 1895. He did not say this was the correct way of assessing the works, but only wished to point out that the increase was very considerable. He drew attention to the case of the *Phœnix Gas Company v. Lee;* and he thought the Magistrates could not do better than proceed on the principles therein set out, and apply them to the present case. The net profits of the Cleveland Company in 1896 were £670; and from this basis they had to assess the rateable value. The Company's expenses in 1895 were £1693; and taking 5-12ths of this sum, it would give £705, which would be a fair amount of capital for a tenant to carry on the works. To this there must be added £100 for loose plant and tools, which the Manager (Mr. W. Collier) had put at a reasonable figure; and there must also be added the value of the meters (£1000), which would give £1805 as the total working capital of the tenant. It was decided that 17½ per cent. was a fair amount to deduct from the annual receipts to arrive at a gross estimated rental. If £315 (being 17½ per cent. on £1805) be deducted from £670, it left £355—a supposed gross estimated rental derived from the works. From this there had to be taken the statutable deductions which they were entitled to make. The first deduction was for the probable annual repairs to plant, &c. This had been put at the low figure of £163; but he would ask the Bench to considerably increase the amount. After all the expenses had been met, the net income from the works had been £670. A sum of £62 would be allowed for the probable average yearly cost for repairs to mains and meters. If £225 were taken off the gross estimated rental (£355), it left £130 as the rateable value of the Company's premises.

Mr. *W. Collier,* Manager of the Company, gave evidence to corroborate the figures advanced by Mr. Hardy. He said the value of the meters was put at £1000; and they were in an efficient state of repair. The loose tools, &c., were valued at £100.

Cross-examined: It was 21 years last January since the Company commenced supplying gas; and he was prepared to give £1000 for the meters now in use.

Mr. RICHARDSON said that the matter seemed to be an extremely small one; and from what had been said by his friend, it would appear that the Company should not be rated at all. In his (Mr. Richardson's) opinion, the rateable value should not be £130, but something over £500. The Act said that the Committee should take into account the probable average annual expenditure for repairs, &c. The original cost of the meters was £1013; and they were now valued at £1000, after being in use for 21 years. They were only guaranteed for five years, and for two years after being repaired. It was absurd to think that they should be worth only £13 less now than when they were first put in. The net expenditure for repairs, &c., was £1257, and taking 5-12ths of this gave £650, which was the amount allowed for interest on the tenants' capital. In regard to the value of the meters, the Assessment Committee had taken them at £750; and they made the tenants' working capital £1600, on which they had allowed 17½ per cent. For repairs, &c., they had allowed £310.

Evidence was given by Mr. *Hedley,* valuer, and Mr. *T. T. Willman,* valuer.

The CHAIRMAN, after consultation with his colleagues, intimated that they must take time to consider the case, and would forward their decision to the Company and the Assessment Committee.

Claim for Damages against the Newcastle and Gateshead Gas Company.

At the Newcastle Winter Assizes, on the 26th ult., before Mr. Justice Ridley and a Jury, Messrs. Walkers, Parker, and Co., Limited, brought an action against the Newcastle and Gateshead Gas Company for damages sustained by them owing to the alleged negligence of the Company. The plaintiffs, who are lead manufacturers, asserted that the defendants permitted gas to escape, whereby on Dec. 4, 1896, an explosion was caused which did damage to their works. Another count in the statement of claim was that the defendants were guilty of negligence in connection with the custody of the gas. The defendants did not admit that they allowed any quantities of gas to escape; and they said that, if any such escape occurred, it was due to causes not attributable to their negligence. Defendants further said that no damage had been suffered by the plaintiffs. Mr. Strachan, Q.C., and Mr. Mundahl appeared for the plaintiffs; Mr. E. Tindal Atkinson, Q.C., and Mr. T. Willes Chitty represented the defendants. On the east of the plaintiffs' works, which adjoin those of the Company, is Shoe Factory Lane, down which ran a 3-inch gas-main, which joined a larger main running along Skinnerburn Road, at the end of the lane. For some time before the 4th of December, there had been a smell of gas in the road. When the works were closed at five o'clock that day, everything was in order; whereas at six o'clock on the following morning, when the men went to work, there were indications of an explosion having occurred. A witness, who resided with his father in one of a number of cottages at the angle of the lane and road, stated that he used the water-closet in their cottage on the night of Dec. 4, and threw a lighted match into the pan, whereupon there was a violent explosion. The father of this witness stated that there had been a strong smell of gas during the evening. A number of other witnesses were called. For the defendants, it was submitted that there was no case on the question of negligence. The plaintiffs rested their case upon the simple fact that there had been an explosion; but it was contended that the mere fact of an explosion occurring was no evidence of negligence. His Lordship said to his mind the point was whether the explosion occurred because the defendants did not properly repair, and keep in repair, their pipes, or whether, from some cause or other, the pipe broke. It might have been a slip in the land which caused it; and in such case the defendants would not be liable. If, on the contrary, the Jury thought the pipes had been neglected, the defendants would be liable. He considered the case should be left to the Jury. Mr. Manisty said there had been a falling away of the soil upon which the main rested, with the result that there had been a parting at the joint; and he was sure the Jury would come to the conclusion that the defendants were not responsible for this. In the result, the Jury returned a verdict for the defendants; and his Lordship gave judgment accordingly. A fuller report of the case, which has many points of interest, will appear next week.

Tampering with a Gas Supply.

At the recent Leek Petty Sessions, Frederick Brooks, wood turner, living at Bellevue, was charged with connecting a pipe with the gas-main belonging to the Urban District Council, without the consent of the authorities. Mr. W. E. Allen prosecuted. The evidence of two meter inspectors showed that they found an india-rubber tube connected with the main, by which means gas could, of course, be used without passing through the meter. On making the discovery, the supply was cut off and the meter removed. The defendant, who pleaded guilty, said he was merely trying an experiment with a view to obtaining a better light. He was fined £3 3s. and costs, or one month's imprisonment in default.

The Last of the Thirlmere Water-Works Arbitrations.—The final arbitration in connection with the Thirlmere Water-Works of the Manchester Corporation has been finished, and the award made. It was a claim by the Executors of Mr. Watt, one of the Contractors, for extra work; and it amounted to the large sum of £95,000. Sir John Harwood had the satisfaction of reporting at last Wednesday's meeting of the City Council that the award only came to £16,709. He also claimed, with some amount of pride, that the Thirlmere was the first large scheme of water supply that had been successfully carried out within the four corners of the estimate.

City of St. Petersburg New Water-Works Company, Limited.—The 25th ordinary general meeting of this Company was held last Tuesday, at the Cannon Street Hotel. Mr. W. T. Western presided, and, in moving the adoption of the report, which was noticed last week, observed that very few events of moment had happened during the past year. The most important one was that Russia had finally adopted a gold standard, and therefore the Company's revenue would now always be paid in gold, and there would be no question with regard to the fluctuations in exchange, except in minute fractions in connection with bankers' charges. They would therefore know, within a few pounds, what they might expect to receive for the remainder of the Company's existence. The report was adopted.

MISCELLANEOUS NEWS.

THE GASLIGHT AND COKE COMPANY'S BILL.

The Objects of the Measure.

In view of the second reading of the above-named Bill, which, as notified in our "Parliamentary Intelligence," is set down for Thursday next, the following circular has been issued:—

The objects of the Bill are twofold—first, the consolidation of preference and debenture stocks; second, the simplification of the ordinary stock on the sliding-scale basis. The Bill does not alter in any way the relative rights of the consumers and proprietors *inter se*.

The principle of the Bill has been repeatedly affirmed by Parliament—viz., as regards the preference and debenture stocks, in the case of numerous railway companies; and as regards the ordinary stock, in the following Metropolitan, Suburban, and Provincial Gas Companies:—

South Metropolitan Gas Company (1896).
Bristol United Gaslight Company (1891).
Oxford Gaslight and Coke Company (1892).
Crystal Palace District Gas Company (1893).
Plymouth and Stonehouse Gaslight and Coke Company (1894).
Victoria Newmarket Gaslight and Coke Company (1895).
Scarborough Gas Company (1895).
Cheltenham Gaslight and Coke Company (1896).
Ilfracombe Gaslight and Coke Company, Limited (1896).
Guildford Gaslight and Coke Company (1896).

The passing of the Bill cannot affect prejudicially the interests of the consumers in any respect. On the contrary, any effect it will or may have will be to the consumers' benefit.

There are two benefits, one of which will, and the other may, arise from the passing of the measure: First, the simplification and reduction of the office clerical work. The saving arising under this head will go, in the proportion of one-sixth part to the Company and five-sixths to the consumers in cheapening the price of gas. Second, the replacement of the fictitious nominal value of the stock by a face value which will more closely approach its market value. This may, by rendering the stock more marketable, to some extent enhance the price. Should this be so, it will be of distinct benefit to the consumers, by reason of the higher premium which will be obtained on all future issues of stock. As the premium capital bears no interest, the greater the amount of premium obtained, the lower the average rate of interest on the amount of capital employed by the Company and *pro tanto* the lower the price of gas.

The only objections put forward as yet have been—first, that the change in the nominal value of the open stock would tend to "obscure" the "extraordinarily favourable conditions" of the sliding-scale bargain to the Gas Company. But that is to assume that Parliament has already legislated in the direction of such "obscurity" in the case of the South Metropolitan and other Gas Companies, and that all the facts will not be laid before Parliament by the Board of Trade and the public authorities when further powers are sought. The second objection is that the passing of the Bill would increase the market value of the stock, and so increase the price to be paid for the Company's interest if at any time hereafter the municipal authority were empowered to purchase the undertaking.

As far as can be ascertained, there is no precedent for a public authority acquiring a gas company's undertaking on the basis of the market price of its stock. The dividend paid and capable of being maintained has always formed the governing factor in fixing the price.

Under the operation of the sliding-scale and auction clauses, which have now for many years past been applied by Parliament to gas undertakings, the proprietors and the consumers are in partnership. Whatever injures the Company injures the consumer; and, *vice versâ*, whatever benefits the one benefits the other. Moreover, the effect of the application of the sliding-scale clauses to this Company has been vastly more favourable to the consumer (the public) than to the shareholder; the proportion of advantage being approximately five-sixths to the consumer and one-sixth to the shareholder.

PROVINCIAL GAS AND WATER COMPANIES.

Gas Companies.

The Directors of the Brighton and Hove Gas Company will report at the meeting of shareholders next Friday that a satisfactory augmentation in the consumption of gas in the outlying districts has resulted from the reductions in price announced in the previous report. There was a small increase in the gas and meter rental in the six months ending Dec. 31, though, of course, the weather was against this. The revenue from the sale of gas was £66,517; and from residuals, £11,654—the total receipts being £81,988. The expenditure on the manufacture of gas was £42,138 (the coal, coke, and oil employed costing £27,801); on its distribution, £7506; and on management, £4150—the total expenses being £57,551. The balance carried to the profit and loss account is £24,437; and the amount available for distribution, £26,912. The Directors recommend dividends for the half year at the rate of 11½ per cent. per annum on the original ordinary consolidated stock, 8½ per cent. per annum on the "A" stock, and 6 per cent. per annum on the "B" preference stock. For the payment of these dividends £23,450 will be required; leaving a balance of £3462. Under the supervision of Mr. J. Cash, M.Inst.C.E., 34,323 tons of coal and 365,192 gallons of enriching oils were employed in the manufacture of gas, of which 475,968,500 cubic feet were sold. The estimated quantities of residuals produced were: Coke, 20,593 tons; breeze, 1556 tons; tar, 426,109 gallons; ammoniacal liquor, 812,283 gallons.

The annual general meeting of the Brynmawr and Blaina Gas Company was held on the 23rd ult.—Mr. J. Phillips, J.P., in the chair. The report presented stated that the reduction in the price of gas which took place at the beginning of last year had resulted in an increase in the consumption. The Directors intend, during the current twelvemonth, to introduce automatic prepayment meters. An interim dividend of 5 per cent. was declared for the June half year; and a similar payment was now recommended for the six months ending Dec. 31. In moving the adoption of the report, the Chairman expressed his gratification at the highly satisfactory condition of the Company. Notwithstanding a reduction of 6d. per 1000 cubic feet which came into force on Jan. 1, 1897, the profits made during the year were equal to 11½ per cent. on the total capital. The increase to the extent of 1½ million cubic feet of gas made up to now, as compared with the corresponding period of 1897, was very gratifying, considering the mild open winter. He hoped that this rate would be fully maintained, and that a further reduction in price would be soon announced. The thanks of all present were due to Mr. Acland, the Engineer and Manager, for the capital work he had done since he took full charge of the undertaking. The Directors had pleasure in announcing their intention to present him with a further gratuity, in recognition of his services in connection with extensions, a new purifier-house, and the No. 2 gasholder, so well and efficiently carried out. The report was adopted, and the dividend recommended was declared.

The annual report of the Directors of the Canterbury Gas and Water Company, which was noticed in the "JOURNAL" for the 22nd ult., was presented at the shareholders' meeting yesterday week by the Chairman, Mr. D. Amos. He congratulated those present on the satisfactory nature of the accounts, more particularly as at the beginning of the year the price of gas was reduced by 2d. per 1000 cubic feet. They had, he said, earned, and intended to pay, their full statutory dividend of 8¾ per cent. on the combined gas and water capital. The percentage of increase in the sale of gas had not been so great as in many former years, which might fairly be attributed to the unusually mild and open weather during the last month or two of the year. The very general adoption of incandescent gas-burners had also had some effect. They had commenced the system of supplying gas by prepayment meter. In the three months it had been in vogue, no less than 388 houses had been connected; and with orders now on hand, and the future demand, no doubt they would soon have 1000 of these meters fixed. Speaking of the residuals, he said that the accounts showed a considerable increase in the return for sulphate of ammonia; but this was owing to their having obtained a larger production of sulphate per ton of coal carbonized by means of new plant which had been in use during the year. The water supply retained its character both in regard to purity and quantity. The greatest difficulty they experienced was the loss of gas and water by leakage due to the damage occasioned by traction-engines and steam-rollers. The report was adopted. An extraordinary meeting was subsequently held at which it was agreed to convert the present loan capital of £6500 on the water undertaking into consolidated "B" stock.

At the recent annual meeting of the Chelmsford Gas Company, the Directors reported that the net revenue from all sources in the past year amounted to £2941—an increase of £518 upon the preceding twelve months. They thought it right to raise the reserve fund to £1000, and therefore they appropriated £90 for this purpose, and in addition paid out of the revenue £350 towards the adverse balance on the suspense or depreciation account, leaving £600 still to be provided for. There had been an increase to the extent of upwards of 6 per cent. in the gas sold. The profit and loss account showed a balance of £2644 available for distribution; and the Directors recommended a dividend of 8 per cent. per annum on the original share capital, and £5 12s. per cent. on the additional share capital. The Chairman (Mr. W. W. Duffield), in moving the adoption of the report, said it showed a considerable improvement in the affairs of the Company. It was highly satisfactory to note this, when they remembered the fierce competition they were subjected to by the Chelmsford Electric Light Company. However, provided the Gas Company kept up to date, they need not fear competition. In conclusion, he mentioned that the dividend recommended was an increase of 1 per cent. on that for last year. The larger revenue was due, in a great measure, to the improved management. The report was adopted.

The business of the Cradley Heath Gas Company continues to make good progress—the quantity of gas sold during the past half year having increased by 15 per cent. over the corresponding period of 1896. The net revenue account shows a profit of £1555, from which the usual dividends have been declared, and £500 transferred to the renewals account for the re-building of the retort-house—leaving £419 to be carried forward. Several improvements are being made in the works; among them being a new holder designed to hold 500,000 cubic feet of gas.

The shareholders of the Douglas Gas Company met yesterday week. The half-yearly accounts showed a disposable balance of £5900, from which it was agreed to pay a dividend of 35s. per share, place £500 to the reserve fund (making it £5700), and carry forward £1780. Notwithstanding the mildness of the winter, the reduced price of gas, and the increased cost of coal, the profits exceeded those of the previous half year. The report was adopted.

The accounts presented at the annual general meeting of the East Grinstead Gas and Water Company on the 24th ult., showed a balance of £1875 available for distribution; and the Directors in their report recommended dividends of £7 and £4 18s. per cent., free of income-tax. The Chairman (Mr. W. V. K. Stenning) moved the adoption of the report. He said with regard to the receipts from the sale of gas, which were £3610, as compared with £3223 in 1896—an increase of about £400—he felt bound to state that the additional revenue was very much the result of the policy adopted by the Directors some time ago of supplying gas to the smaller consumers on the automatic prepayment system; and they were determined that, in any reduction which might be made in the price, those who had contributed to the increase should have the benefit. As to the supply of water, it was just about stationary. Since the report had been sent out, the Directors had reconsidered the question of the price of gas, and had unanimously decided to reduce it from 4s. 4d. to 4s. per 1000 cubic feet after the present quarter. The original intention was to make a reduction of 2d.; but the Directors thought no damage would be done to the shareholders' property by the larger concession, and it might, they hoped, be the means of inducing a greater consumption of gas throughout the town and district. The motion was carried unanimously; and the dividends recommended (which are an advance of 1 per cent.) were declared. Thanks were accorded to the Secretary (Mr. E. A. Head), the Gas Manager (Mr. D. T. Livesey), and the Water Manager (Mr. R. G. Payne) for their efficient services. It may be mentioned that during the past four years the sale of gas has increased 50 per cent.

The annual general meeting of the Exeter Gas Company was held on the 22nd ult. The usual dividends were declared; £500 was placed to

the insurance fund; and the balance of the profit for the year—exceeding £1000—was carried to the credit of the profit and loss account for the current twelve months.

Last Thursday afternoon, the half-yearly meeting of the Hastings Gas Company was held, under the presidency of Dr. G. G. Gray, J.P. The accounts for the six months ending Dec. 31 showed a profit balance of £10,028; and the Directors recommended the payment of dividends at the rates of 13 per cent. per annum on the £25 shares, and of 10 per cent. per annum on the £20 shares—the balance to be carried forward. In moving the adoption of the report, the Chairman said there had been an increase of 6½ million cubic feet in the quantity of gas consumed. The receipts had gone up £1100; and the expenditure, £747—leaving a net increase of profit of £353. There had been a rise of £206 in the income from coke. The number of cooking-stoves had augmented by 521 during twelve months, and the prepayment meters by 436; while the Company had 629 new consumers. The report was adopted.

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The profit realized by the Lewes Gas Company in the six months ending Dec. 31 last was £1844. The balance standing to the credit of the profit and loss account is £2415; and the Directors recommend dividends at the rates of 10 and 7 per cent. per annum upon the original and new stocks. The payment of these will, after deducting income-tax, amount to £1384, and leave a balance of £1031 to be carried forward to this year's accounts.

The ordinary general meeting of the Londonderry Gas Company was held last Tuesday, when the accounts for the year 1897 were presented. The revenue amounted to £16,323; the expenditure, to £11,583—leaving a balance of £4740. Out of this the Directors recommended the payment of a dividend at the rate of 11 per cent. per annum, free of income-tax, which would leave a surplus of £564. The balance of the profit and loss account, including the above-named £4740, was £17,499. The Chairman (Mr. W. Tillie, D.L., J.P.) moved the adoption of the report; and in doing so congratulated the shareholders on another prosperous year. He said the gas industry was a progressive one all over the country; and Londonderry was no exception. The Company was steadily increasing from year to year; and last year's output was the largest they had ever had—the make exceeding that of any previous year by 5 million cubic feet. They were still menaced with the electric light; but he considered that with the improvements that were continually being made in gas lighting, especially in connection with the incandescent system, consumers would be very slow to dispense with that kind of gaslight and substitute electricity at an increased cost. On this ground alone their position was a pretty secure one; so that they need not trouble themselves as to the future. Sir W. Miller seconded the motion; and it was carried unanimously. Votes of thanks were accorded to the Directors, as well as to the Manager and Secretary (Mr. John Macnie), for their services.

At the recent half-yearly meeting of the Normanton Gas Company, the Chairman (Mr. E. Mitchell, J.P.), in moving the adoption of the Directors' report, said the profit for the six months ending Dec. 31 amounted to £1041; making the sum available for distribution (after providing interest on mortgage) £2956. The leakage, he was sorry to say, had increased from 16 to 17 per cent. on the quantity of gas made, owing to the fact that scarcely a week passed without some joints being forced or pipes broken by the continual subsidence of the ground. The sale of gas had increased to £2293 (£282 by prepayment meters). As to residuals, the markets had been very bad. The payment of £1000 in dividend would leave £1956 to be carried forward. The undertaking was in a sound and healthy condition, and likely to continue to improve, judging by the applications for meters that had already been received, and the necessity for new mains. The report was adopted, and a dividend of 10 per cent. was declared.

The annual accounts of the Redcar and Saltburn Gas Company show that the revenue has increased by the substantial sum of £600. The amount realized from private consumers in the year was £4618; gas used for cookery purposes, £1456; public lighting, £545; prepayment meters, £345; and residuals, £1206. After payment of all charges, the balance of profit was £3601. A dividend of 5 per cent. has been declared; making, with the interim payment, 9 per cent. for the year.

The annual general meeting of the Rugby Gas Company was held on Monday last week—Mr. J. Parnell in the chair. The Directors' report showed that the affairs of the Company are in a satisfactory condition, and the works, which are under the supervision of Mr. C. Meiklejohn, in a high state of efficiency. The receipts on revenue account for the past year amounted to £13,442; the expenditure (including bad debts), to £9051, leaving a balance of £4391 to be carried to the profit and loss account. This balance, after deducting £2004, the interim dividend, added to £3312, the net balance remaining after payment of the dividend for the six months ending Dec. 31, 1896, with the interest on moneys deposited, less interest paid on mortgages, made a total of £5447. The Directors recommended a dividend for the half year at the rate of 12 per cent. per annum, amounting to £2004, free of income-tax; making with the interim dividend 12 per cent. for the year. A sum of £10,368 was received last year for gas sold (58,024,700 cubic feet in Rugby, and 694,900 cubic feet outside the town), and £2256 for residual products. The expenditure on the manufacture of gas came to £6845; on its distribution, to £402; and on management, £953. During the year 7985 tons 7 cwt. of coal were carbonized; the estimated production of residuals being 4791 tons of coke, 477 tons of tar, and 824 tons of ammoniacal liquor. The report was adopted. The appointment by the Directors of Mr. T. Beasley to fill a vacancy created on the Board by the death of Mr. J. S. Savage was confirmed; and their decision to propose an increase of their number by one was supported by the election of the former Engineer and Manager (Mr. Peter Simpson). The proceedings closed with the usual votes of thanks. At a meeting of the Directors subsequently held, it was resolved to raise the salary of Mr. Meiklejohn by £50 per annum.

The gross receipts of the Sevenoaks Gas Company in the past half year amounted to £6468, and the expenditure to £4358—the result being a profit of £2110. The balance at the credit of the profit and loss account was £3867, from which the statutory dividends of 10 and 7 per cent. have been declared.

The report of the Shotley Bridge and Consett Gas Company states that the quantity of gas sold in the past half year was 26,134,000 cubic feet; being a slight increase on the corresponding period of 1896. The sale of residual products improved a little, though still very depressed in value. The total expenditure amounted to £3162, and the receipts to £4895; leaving a balance of £1733. After the payment of interest on loans, there remains £1663 available for distribution, from which dividends of 5 per cent. on the consolidated stock and "A" capital and 3½ per cent. on the "B" capital have been declared. The Company's capital being now nearly exhausted, it will shortly be necessary to apply to Parliament for further powers.

In moving the adoption of the report of the South Shields Gas Company (noticed in the "JOURNAL" for the 22nd ult.) at the annual general meeting on the following Friday, Mr. R. Wallis, the Chairman, stated that though the Directors had not a very brilliant report to present, they had a fairly satisfactory one. The loss on the residuals for the year amounted to the large sum for them of £2188. But, strange to say, this loss had been made up by one item—the large manufacture and increase in the sale of gas, which had amounted to the money value of £3368. This was the best criterion they could have of the prosperity of the Company. Coal gas had not lost any of its influence in public opinion, nor had the decrease in their revenue been caused by any of their rivals. It was simply owing to the large fall in residuals. During the year they had 558 new consumers—making a total of 9631; and they had every reason to expect that the number would progress in the same ratio. He might safely say that they were in a prosperous condition. They had a good expense account; their reserve and insurance funds were both assuming appreciable proportions; and they had fairly earned their maximum dividend. Dr. J. F. Armstrong seconded the motion; and it was carried. A dividend of 4¾ per cent. was declared; making with the interim dividend 9¼ per cent. for the year.

The annual meeting of the Walker and Wallsend Gas Company was held on Friday, the 25th ult., at the Company's offices, Walker—Mr. T. Crawford in the chair. In moving the adoption of the report, the Chairman congratulated the shareholders on the fact that it showed an augmentation to the extent of 11½ million cubic feet of gas made as compared with the previous year. This, he added, would have been considerably larger had not the operations of the engine builders been interfered with by the recent dispute. The capital account had been increased by £5447, which had been met by mortgage bonds and loans. The balance carried forward at the end of the year was £3585. On the capital of the Company the amount expended per ton of coal carbonized was £5 0s. 8d., which contrasted very favourably with other companies. Owing to the price of coal being so high, and that of the residuals so low, the Directors were not able to reduce the price of gas, which they had hoped to do. Their increased plant during the year would enable them to supply a much greater quantity of gas. Mr. G. A. Allan seconded the motion; and it was carried.

Water Companies.

The half-yearly general meeting of the Dorking Water Company was held on the 25th ult. The accounts showed that the receipts for the six months ending Dec. 31 amounted to £1524, and the expenditure to £523; leaving a profit of £1001. After payment of the interest on the mortgages, and on amounts paid in advance of calls, there remained a net profit of £903. Adding to this £414 brought forward, and £10 interest received on the bank deposit, the sum available for distribution was £1327. The Directors recommended the declaration of dividends for the year 1897 of 6 per cent. per annum on the preference shares, 7 per cent. per annum on the amounts paid up on the "B" shares, and 8 per cent. per annum on the ordinary shares, on which interim dividends of 2½ per cent. were paid on the 30th of September last. They further recommended that the sum of £100 should be carried to the credit of the reserve account. These payments would absorb £1252, and leave a balance of £75 to be carried forward. The recommendations were adopted.

The balance at the credit of the profit and loss account of the Sevenoaks Water Company has enabled the shareholders to declare, on the recommendation of the Directors, a dividend at the rate of 9 per cent. per annum on the consolidated stock, and £6 6s. per cent. per annum on the share capital. This will absorb £1177, and leave a balance of £425, of which £200 is to be carried to the depreciation fund.

At the recent ordinary general meeting of the Trowbridge Water Company, held in Cambridge under the presidency of Mr. D. Adams, the Directors recommended a dividend of 4½ per cent. per annum. In moving the adoption of the report, the Chairman referred to the defalcations of Mr. W. Peed, the former Secretary, who has absconded, and stated that the Company might happily consider themselves, so far as the Directors knew, exempt from any losses on this account. The dividend recommended was declared. The Manager (Mr. W. W. Gray) reported that the works were in good order.

The half-yearly general meeting of the West Surrey Water Company was held last Tuesday—Mr. A. T. Simpson, M.Inst.C.E., in the chair. The report and accounts for the six months ended Dec. 31, which showed that the income amounted to £4212, and the expenditure to £1488, were adopted. The balance available for distribution was £2707. Dividends were declared upon the preference shares at the rate of 5 and 6 per cent. per annum respectively, and on the ordinary shares at the rate of 5½ per cent. per annum; after payment of which there was a balance of £891. There were 130 new supplies connected in the past half year; representing a future rental of £218.

OLDBURY GAS SUPPLY.

The Annual Accounts of the Gas Department.

The annual statement of accounts of the Gas Department of the Oldbury Corporation has been issued by the General Manager (Mr. A. Cooke). It shows a good result of the past year's working. The loans outstanding on Dec. 31 amounted to £64,641; so that during the year there had been repaid £5135. The amount spent on plant was £1405, as compared with £807 in the previous year. The cost of manufacturing gas was £6487; being a few pounds less than before. The expenditure on mains and services amounted to £708, or £613 more than in the previous year. Meters cost £300, or £177 more than before, owing to the increased number of prepayment meters fixed; there being nearly 600 of these meters now in operation. The total expenditure was £8941, against £8181 in 1896. The gross profit was £5293, as compared with £4538—an increase of £755, notwithstanding the extra amount spent. The sale of gas realized £11,347, against £10,284 in 1896—an increase of £1063; and residual products brought in £2622, against £2286. The total receipts amounted to £14,234, as compared with £12,720. After the repayment of loans and interest, there remained a net profit of £1860, against £345. In 1896 there was expended a sum of £650 in acquiring mining rights near the gas-works. But, reckoning this, the net profit then was only £996; so that the increase amounts to £864. The statements referring to the working show that 7548 tons 18 cwt. of coal and 194 tons 2 cwt. of cannel were used in the production of gas, of which about 73,796,000 cubic feet were sold. The make of coke was 5036 tons 9 cwt.; of breeze, 185 tons 11 cwt. 2 qrs.; of tar, 106,655 gallons; of ammoniacal liquor, 198,275 gallons.

At the meeting of the District Council last Friday, the Gas Committee recommended that the salary of Mr. Adam Cooke, the Gas Manager, should be increased £25 per annum. They also proposed that the price of gas be reduced 1d. per 1000 cubic feet for lighting and cooking purposes; and that gas supplied for motive power be charged at 2s. per 1000 cubic feet, less 5 per cent. discount, from the last reading of the meters. Mr. J. W. Wilson, M.P., in moving the adoption of the recommendations, said it was a source of congratulation that the gas undertaking had been so much more profitable this year than in any preceding year, with one exception. They could congratulate themselves that there was a profit on the residuals, as in neighbouring towns, including Smethwick, they had to report a loss. The balance carried forward on the profit and loss account was £1800. The report was adopted. It was also decided to transfer £400 from the profits to the relief of the rates.

BLACKPOOL CORPORATION GAS SUPPLY.

Free Supply of Gas-Burners and Grillers.

In the "JOURNAL" last week (p. 492), reference was made to the decision come to by the Gas Committee of the Blackpool Corporation to arrange for the inspection of consumers' burners and the supply of new ones gratis in cases where defects were found. The Committee have also decided to provide consumers with grillers free of charge. The matter came before the Town Council last Tuesday.

Mr. FISH asked for further information with respect to the new departure instituted by the Committee.

Mr. GRIME explained that the Gas Manager (Mr. J. Chew) had pointed out to the Committee the unsatisfactory condition of most gas-burners, and had stated that the quality of the gas was often complained of when the real fault was possibly the burners. He proposed to set a man apart to visit all the gas consumers, and ask them if they required new burners. The consumers would have the advantage of this practical and technical survey; and it was hoped that, by the consumers having the full advantage of the gas consumed, all complaints as to quality would be done away with. The proposal was entirely in the interests of the consumers. The supply of free grillers was a very bold experiment. It was proposed to put in any house a small griller, to be attached to the gas-pipe by an india-rubber connection, to grill bacon, fish, or boil a kettle. It was not to be a cooking appliance for a dinner, but merely a morning arrangement for the convenience of a large number of householders. Mr. Chew thought it would be remunerative to give these things; and the Committee, who knew that his wisdom and management up to now had been so excellent, had every confidence in him, and gave their consent. A number of small grillers would be purchased by the Corporation, stamped by them so that they could not be taken away, and loaned out. He should watch the experiment with some interest; and if it was not productive of good financial results to the Committee, he should oppose its further extension.

Mr. HEAP remarked that the new arrangement was another tribute to Mr. Chew's business capacity. He did not object to the capital charge, because there would be at least 25 per cent. profit on the gas consumed during the year. It was not for them, having charge of the finances of the town, to object to the scheme. All that could be done was to leave the consumers to look to their own interests, while the Corporation studied its own.

Mr. HOWARTH pointed out that they had a large quantity of penny-in-the-slot meters, and by using the grillers in connection with them, more gas would be consumed through this better-paying source. If the scheme was not a success, they could depend on Mr. Chew stopping it.

Mr. BICKERSTAFFE thought the matter needed more consideration. It was the beginning of something of which they did not know the end. He had no objection to the new arrangement if it stopped there; but if the Corporation lent these things, below cost price, why should not the Highway and other departments let their materials out in the same way? The talk about poor burners and such like was all nonsense. Mr. Chew was perhaps thinking he had got electricity as a competitor; but he would take good care the customer did not know, until the bills came in, that the new burners were passing a greater quantity of gas. It would be a serious matter to the tenant, and also to others, for the Corporation to compete with the retail shopkeeper at a price no tradesman could approach. He contended that the adoption of the scheme meant following the principle of the Corporation interfering with the legitimate rights of private tradesmen.

Alderman COCKER was entirely against the articles in question being supplied free. If they were going to give grillers, why not cooking-stoves? How many grillers were they allowing to a house—three? ("No.") Then supposing one of the tenants wanted money for a glass of beer, he would take the griller to the pawnshop. His view was to let the people buy these things. Let the town supply the gas, and let the matter stop there. He proposed, as an amendment, that the burners and grillers should not be supplied.

Mr. BICKERSTAFFE seconded the amendment.

Mr. SMITH contended that the defects complained of arose from want of pressure, and not from bad burners and inadequate fittings.

Alderman FISHER said most of the grillers would be used by people having slot meters; and on gas consumed in this way they received a good deal more per 1000 cubic feet. He pointed out that men had gone about the town selling burners which were said to use less gas; and when the people began to find they were better served by the Corporation, there would perhaps be more general satisfaction and less complaining. As to competing with shopkeepers, he pointed out that gas-stoves were let out on hire in other places; and he asked that every trade should stand on its own bottom.

Mr. BROWN, in supporting the minutes, utterly denied Mr. Bickerstaffe's statement as to Mr. Chew being opposed to private traders in the town.

Mr. BRODIE (the Chairman of the Electric Light Committee) thought if there was any injustice in the scheme it was to the electric light consumers, who had already to pay meter-rents. This light could be improved if the lamps were renewed oftener; and he thought if grillers were supplied to the gas consumers, the electricity consumers would be justified in asking for free lamps and the abolition of meter-rents.

Mr. BICKERSTAFFE again asserted that if they committed themselves to making the Corporation a trading concern in opposition to private tradesmen, he would, at the next meeting of the Highway Committee, move that they sell their materials at no profit.

Mr. KINGSBURY supported the minutes. He mentioned the case of a working man going out early in the morning, and said he would be tempted to use the gas to minister to his comforts; and so the profits of the Gas Department would be increased. It had been suggested that the principle should be carried further, and that cookers should be provided. If it could be shown that by the supply of a cooker costing £1 the Corporation made £3 or £4 during the year, he should not be against the experiment. He thought the policy a very businesslike one; and it ought to be backed up.

Mr. BATTERSBY said the grillers would only cost a few shillings; and consumers could fix them for themselves. As for taking the trade out of the town, they did not want to do that. The proposal was more for the smaller houses. As for the burners, they were only about 5s. or 6s. a gross, and they would only be supplied where people asked for them—not against their wishes.

The amendment was then put, but only the mover and seconder voted for it. The minutes were therefore approved.

CAGLIARI GAS AND WATER COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Tuesday last, at the London Offices, No. 3, Lothbury, E.C.—Mr. F. W. BLUNT in the chair.

The SECRETARY (Mr. W. B. Peat) read the notice calling the meeting; and it was agreed to take as read the report and accounts, of which the principal features have already been published (*ante*, p. 421).

The CHAIRMAN first expressed regret at the absence of the Chairman of the Company (Mr. John Aird, M.P.), who was unavoidably detained abroad. Proceeding, he said the working of the undertaking during the past year had not brought out quite such a satisfactory result as they had been accustomed to; and it seemed as though there had been a momentary check to the tide of prosperity which had attended the Company for many years past. But they had every reason to hope that it was only temporary, and that they would still continue to increase, as they had been doing hitherto, the receipts both for gas and water. The result of the past year's business was that the Board were unable, much to their regret, to recommend quite the same rate of distribution as had of late years been customary. They proposed the declaration of the same dividend, but not quite the same bonus. A note which had been published for many years in the accounts gave the keynote of the reason for this diminution. It said: "By the eleventh Article of the Concession, the fixed annual payment for the water supply in Cagliari is: For the first thirty years, from 1867 to March 19, 1897, £9600; for the second thirty years, from March 20, 1897, to March 19, 1927, £7600; and for the third thirty years from March 20, 1927, to March 19, 1957, £5600." So that last year there came into effect the diminution of £2000 a year in the sum paid to the Company by the Consorzio for the water supplied. This, as would be seen, was practically the measure of the falling off in the receipts in the past year. They had made a little improvement as he would explain later; but, speaking generally, the reduction in the annual payment had been the cause why the results had not come out quite as they would have liked them. Comparing the accounts with those for 1896, the expenditure had on the whole been rather less than in the previous year—viz., £11,300, as against £11,600; but in the details of this outlay, there had been a good deal of difference. For instance, the expenditure on the water-works had been less than in the previous year, as might be expected considering that in 1896 there was a water famine, which gave a good deal of trouble to the Company. On the other hand, the expenditure in relation to gas manufacture had been more in the past year than in 1896—this being partly due to the cost of freight, increased outlay on coal, and other minor matters. The rates and taxes in Cagliari were also higher last year. It might have been supposed that these would have been less as the revenue had not been so large. But he must explain that the rates and taxes paid last year were based upon the declaration in 1896 of the profits of 1895; so that the taxes payable now were for their record year of 1895. The general charges in London remained about the same; but they had made a considerable gain in exchange on remittances this year. The loss was only about £900 as

the insurance fund; and the balance of the profit for the year—exceeding £1000—was carried to the credit of the profit and loss account for the current twelve months.

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At the recent half-yearly meeting of the Normanton Gas Company, the Chairman (Mr. E. Mitchell, J.P.), in moving the adoption of the Directors' report, said the profit for the six months ending Dec. 31 amounted to £1041; making the sum available for distribution (after providing interest on mortgage) £2956. The leakage, he was sorry to say, had increased from 16 to 17 per cent. on the quantity of gas made, owing to the fact that scarcely a week passed without some joints being forced or pipes broken by the continual subsidence of the ground. The sale of gas had increased to £2293 (£282 by prepayment meters). As to residuals, the markets had been very bad. The payment of £1000 in dividend would leave £1956 to be carried forward. The undertaking was in a sound and healthy condition, and likely to continue to improve, judging by the applications for meters that had already been received, and the necessity for new mains. The report was adopted, and a dividend of 10 per cent. was declared.

The annual accounts of the Redcar and Saltburn Gas Company show that the revenue has increased by the substantial sum of £600. The amount realized from private consumers in the year was £4618; gas used for cookery purposes, £1456; public lighting, £545; prepayment meters, £345; and residuals, £1206. After payment of all charges, the balance of profit was £3601. A dividend of 5 per cent. has been declared; making, with the interim payment, 9 per cent. for the year.

The annual general meeting of the Rugby Gas Company was held on Monday last week—Mr. J. Parnell in the chair. The Directors' report showed that the affairs of the Company are in a satisfactory condition, and the works, which are under the supervision of Mr. C. Meiklejohn, in a high state of efficiency. The receipts on revenue account for the past year amounted to £13,442; the expenditure (including bad debts), to £9051, leaving a balance of £4391 to be carried to the profit and loss account. This balance, after deducting £2004, the interim dividend, added to £3312, the net balance remaining after payment of the dividend for the six months ending Dec. 31, 1896, with the interest on moneys deposited, less interest paid on mortgages, made a total of £5447. The Directors recommended a dividend for the half year at the rate of 12 per cent. per annum, amounting to £2004, free of income-tax; making with the interim dividend 12 per cent. for the year. A sum of £10,368 was received last year for gas sold (58,024,700 cubic feet in Rugby, and 694,900 cubic feet outside the town), and £2256 for residual products. The expenditure on the manufacture of gas came to £6845; on its distribution, to £402; and on management, £953. During the year 7985 tons 7 cwt. of coal were carbonized; the estimated production of residuals being 4791 tons of coke, 477 tons of tar, and 824 tons of ammoniacal liquor. The report was adopted. The appointment by the Directors of Mr. T. Beasley to fill a vacancy created on the Board by the death of Mr. J. S. Savage was confirmed; and their decision to propose an increase of their number by one was supported by the election of the former Engineer and Manager (Mr. Peter Simpson). The proceedings closed with the usual votes of thanks. At a meeting of the Directors subsequently held, it was resolved to raise the salary of Mr. Meiklejohn by £50 per annum.

The gross receipts of the Sevenoaks Gas Company in the past half year amounted to £6468, and the expenditure to £4358—the result being a profit of £2110. The balance at the credit of the profit and loss account was £3867, from which the statutory dividends of 10 and 7 per cent. have been declared.

The report of the Shotley Bridge and Consett Gas Company states that the quantity of gas sold in the past half year was 26,134,000 cubic feet; being a slight increase on the corresponding period of 1896. The sale of residual products improved a little, though still very depressed in value. The total expenditure amounted to £3162, and the receipts to £4895; leaving a balance of £1733. After the payment of interest on loans, there remains £1663 available for distribution, from which dividends of 5 per cent. on the consolidated stock and "A" capital and 3½ per cent. on the "B" capital have been declared. The Company's capital being now nearly exhausted, it will shortly be necessary to apply to Parliament for further powers.

In moving the adoption of the report of the South Shields Gas Company (noticed in the "JOURNAL" for the 22nd ult.) at the annual general meeting on the following Friday, Mr. R. Wallis, the Chairman, stated that though the Directors had not a very brilliant report to present, they had a fairly satisfactory one. The loss on the residuals for the year amounted to the large sum for them of £2188. But, strange to say, this loss had been made up by one item—the large manufacture and increase in the sale of gas, which had amounted to the money value of £3368. This was the best criterion they could have of the prosperity of the Company. Coal gas had not lost any of its influence in public opinion, nor had the decrease in their revenue been caused by any of their rivals. It was simply owing to the large fall in residuals. During the year they had 558 new consumers—making a total of 9631; and they had every reason to expect that the number would progress in the same ratio. He might safely say that they were in a prosperous condition. They had no suspense account; their reserve and insurance funds were both assuming appreciable proportions; and they had fairly earned their maximum dividend. Dr. J. F. Armstrong seconded the motion; and it was carried. A dividend of 4¾ per cent. was declared; making with the interim dividend 9¼ per cent. for the year.

The annual meeting of the Walker and Wallsend Gas Company was held on Friday, the 25th ult., at the Company's offices, Walker—Mr. T. Crawford in the chair. In moving the adoption of the report, the Chairman congratulated the shareholders on the fact that it showed an augmentation to the extent of 11½ million cubic feet of gas made as compared with the previous year. This, he added, would have been considerably larger had not the operations of the engine builders been interfered with by the recent dispute. The capital account had been increased by £5447, which had been met by mortgage bonds and loans. The balance carried forward at the end of the year was £3585. On the capital of the Company the amount expended per ton of coal carbonized was £5 0s. 8d., which contrasted very favourably with other companies. Owing to the price of coal being so high, and that of the residuals so low, the Directors were not able to reduce the price of gas, which they had hoped to do. Their increased plant during the year would enable them to supply a much greater quantity of gas. Mr. G. A. Allan seconded the motion; and it was carried.

Water Companies.

The half-yearly general meeting of the Dorking Water Company was held on the 25th ult. The accounts showed that the receipts for the six months ending Dec. 31 amounted to £1524, and the expenditure to £523; leaving a profit of £1001. After payment of the interest on the mortgages, and on amounts paid in advance of calls, there remained a net profit of £903. Adding to this £414 brought forward, and £10 interest received on the bank deposit, the sum available for distribution was £1327. The Directors recommended the declaration of dividends for the year 1897 of 6 per cent. per annum on the preference shares, 7 per cent. per annum on the amounts paid up on the "B" shares, and 8 per cent. per annum on the ordinary shares, on which interim dividends of 2½ per cent. were paid on the 30th of September last. They further recommended that the sum of £100 should be carried to the credit of the reserve account. These payments would absorb £1252, and leave a balance of £75 to be carried forward. The recommendations were adopted.

The balance at the credit of the profit and loss account of the Sevenoaks Water Company has enabled the shareholders to declare, on the recommendation of the Directors, a dividend at the rate of 9 per cent. per annum on the consolidated stock, and £6 6s. per cent. per annum on the share capital. This will absorb £1177, and leave a balance of £425, of which £200 is to be carried to the depreciation fund.

At the recent ordinary general meeting of the Trowbridge Water Company, held in Cambridge under the presidency of Mr. D. Adams, the Directors recommended a dividend of 4½ per cent. per annum. In moving the adoption of the report, the Chairman referred to the defalcations of Mr. W. Peed, the former Secretary, who has absconded, and stated that the Company might happily consider themselves, so far as the Directors knew, exempt from any losses on this account. The dividend recommended was declared. The Manager (Mr. W. W. Gray) reported that the works were in good order.

The half-yearly general meeting of the West Surrey Water Company was held last Tuesday—Mr. A. T. Simpson, M.Inst.C.E., in the chair. The report and accounts for the six months ended Dec. 31, which showed that the income amounted to £4212, and the expenditure to £1488, were adopted. The balance available for distribution was £2707. Dividends were declared upon the preference shares at the rate of 5 and 6 per cent. per annum respectively, and on the ordinary shares at the rate of 5½ per cent. per annum; after payment of which there was a balance of £891. There were 130 new supplies connected in the past half year; representing a future rental of £218.

OLDBURY GAS SUPPLY.

The Annual Accounts of the Gas Department.

The annual statement of accounts of the Gas Department of the Oldbury Corporation has been issued by the General Manager (Mr. A. Cooke). It shows a good result of the past year's working. The loans outstanding on Dec. 31 amounted to £64,641; so that during the year there had been repaid £5135. The amount spent on plant was £1405, as compared with £807 in the previous year. The cost of manufacturing gas was £6487; being a few pounds less than before. The expenditure on mains and services amounted to £708, or £613 more than in the previous year. Meters cost £300, or £177 more than before, owing to the increased number of prepayment meters fixed; there being nearly 600 of these meters now in operation. The total expenditure was £8941, against £8181 in 1896. The gross profit was £5293, as compared with £4538—an increase of £755, notwithstanding the extra amount spent. The sale of gas realized £11,347, against £10,284 in 1896—an increase of £1063; and residual products brought in £2622, against £2286. The total receipts amounted to £14,234, as compared with £12,720. After the repayment of loans and interest, there remained a net profit of £1860, against £345. In 1896 there was expended a sum of £650 in acquiring mining rights near the gas-works. But, reckoning this, the net profit then was only £996; so that the increase amounts to £864. The statements referring to the working show that 7548 tons 18 cwt. of coal and 194 tons 2 cwt. of cannel were used in the production of gas, of which about 73,796,000 cubic feet were sold. The make of coke was 5036 tons 9 cwt.; of breeze, 185 tons 11 cwt. 2 qrs.; of tar, 106,655 gallons; of ammoniacal liquor, 198,275 gallons.

At the meeting of the District Council last Friday, the Gas Committee recommended that the salary of Mr. Adam Cooke, the Gas Manager, should be increased £25 per annum. They also proposed that the price of gas be reduced 1d. per 1000 cubic feet for lighting and cooking purposes; and that gas supplied for motive power be charged at 2s. per 1000 cubic feet, less 5 per cent. discount, from the last reading of the meters. Mr. J. W. Wilson, M.P., in moving the adoption of the recommendations, said it was a source of congratulation that the gas undertaking had been so much more profitable this year than in any preceding year, with one exception. They could congratulate themselves that there was a profit on the residuals, as in neighbouring towns, including Smethwick, they had to report a loss. The balance carried forward on the profit and loss account was £1800. The report was adopted. It was also decided to transfer £400 from the profits to the relief of the rates.

BLACKPOOL CORPORATION GAS SUPPLY.

Free Supply of Gas-Burners and Grillers.

In the "JOURNAL" last week (p. 492), reference was made to the decision come to by the Gas Committee of the Blackpool Corporation to arrange for the inspection of consumers' burners and the supply of new ones gratis in cases where defects were found. The Committee have also decided to provide consumers with grillers free of charge. The matter came before the Town Council last Tuesday.

Mr. FISH asked for further information with respect to the new departure instituted by the Committee.

Mr. GRIME explained that the Gas Manager (Mr. J. Chew) had pointed out to the Committee the unsatisfactory condition of most gas-burners, and had stated that the quality of the gas was often complained of when the real fault was possibly the burners. He proposed to set a man apart to visit all the gas consumers, and ask them if they required new burners. The consumers would have the advantage of this practical and technical survey; and it was hoped that, by the consumers having the full advantage of the gas consumed, all complaints as to quality would be done away with. The proposal was entirely in the interests of the consumers. The supply of free grillers was a very bold experiment. It was proposed to put in any house a small griller, to be attached to the gas-pipe by an india-rubber connection, to grill bacon, fish, or boil a kettle. It was not to be a cooking appliance for a dinner, but merely a morning arrangement for the convenience of a large number of householders. Mr. Chew thought it would be remunerative to give these things; and the Committee, who knew that his wisdom and management up to now had been so excellent, had every confidence in him, and gave their consent. A number of small grillers would be purchased by the Corporation, stamped by them so that they could not be taken away, and loaned out. He should watch the experiment with some interest; and if it was not productive of good financial results to the Committee, he should oppose its further extension.

Mr. HEAP remarked that the new arrangement was another tribute to Mr. Chew's business capacity. He did not object to the capital charge, because there would be at least 25 per cent. profit on the gas consumed during the year. It was not for them, having charge of the finances of the town, to object to the scheme. All that could be done was to leave the consumers to look to their own interests, while the Corporation studied its own.

Mr. HOWARTH pointed out that they had a large quantity of penny-in-the-slot meters, and by using the grillers in connection with them, more gas would be consumed through this better-paying source. If the scheme was not a success, they could depend on Mr. Chew stopping it.

Mr. BICKERSTAFFE thought the matter needed more consideration. It was the beginning of something of which they did not know the end. He had no objection to the new arrangement if it stopped there; but if the Corporation lent these things, below cost price, why should not the Highway and other departments let their materials out in the same way? The talk about poor burners and such like was all nonsense. Mr. Chew was perhaps thinking he had got electricity as a competitor; but he would take good care the customer did not know, until the bills came in, that the new burners were passing a greater quantity of gas. It would be a serious matter to the tenant, and also to others, for the Corporation to compete with the retail shopkeeper at a price no tradesman could approach. He contended that the adoption of the scheme meant following the principle of the Corporation interfering with the legitimate rights of private tradesmen.

Alderman COCKER was entirely against the articles in question being supplied free. If they were going to give grillers, why not cooking-stoves? How many grillers were they allowing to a house—three? ("No.") Then supposing one of the tenants wanted money for a glass of beer, he would take the griller to the pawnshop. His view was to let the people buy these things. Let the town supply the gas, and let the matter stop there. He proposed, as an amendment, that the burners and grillers should not be supplied.

Mr. BICKERSTAFFE seconded the amendment.

Mr. SMITH contended that the defects complained of arose from want of pressure, and not from bad burners and inadequate fittings.

Alderman FISHER said most of the grillers would be used by people having slot meters; and on gas consumed in this way they received a good deal more per 1000 cubic feet. He pointed out that men had gone about the town selling burners which were said to use less gas; and when the people began to find they were better served by the Corporation, there would perhaps be more general satisfaction and less complaining. As to competing with shopkeepers, he pointed out that gas-stoves were let out on hire in other places; and he asked that every trade should stand on its own bottom.

Mr. BROWN, in supporting the minutes, utterly denied Mr. Bickerstaffe's statement as to Mr. Chew being opposed to private traders in the town.

Mr. BRODIE (the Chairman of the Electric Light Committee) thought if there was any injustice in the scheme it was to the electric light consumers, who had already to pay meter-rents. This light could be improved if the lamps were renewed oftener; and he thought if grillers were supplied to the gas consumers, the electricity consumers would be justified in asking for free lamps and the abolition of meter-rents.

Mr. BICKERSTAFFE again asserted that if they committed themselves to making the Corporation a trading concern in opposition to private tradesmen, he would, at the next meeting of the Highway Committee, move that they sell their materials at no profit.

Mr. KINGSBURY supported the minutes. He mentioned the case of a working man going out early in the morning, and said he would be tempted to use the gas to minister to his comforts; and so the profits of the Gas Department would be increased. It had been suggested that the principle should be carried further, and that cookers should be provided. If it could be shown that by the supply of a cooker costing £1 the Corporation made £3 or £4 during the year, he should not be against the experiment. He thought the policy a very businesslike one; and it ought to be backed up.

Mr. BATTERSBY said the grillers would only cost a few shillings; and consumers could fix them for themselves. As for taking the trade out of the town, they did not want to do that. The proposal was more for the smaller houses. As for the burners, they were only about 5s. or 6s. a gross, and they would only be supplied where people asked for them—not against their wishes.

The amendment was then put, but only the mover and seconder voted for it. The minutes were therefore approved.

CAGLIARI GAS AND WATER COMPANY, LIMITED.

The Ordinary General Meeting of this Company was held on Tuesday last, at the London Offices, No. 3, Lothbury, E.C.—Mr. F. W. BLUNT in the chair.

The SECRETARY (Mr. W. B. Peat) read the notice calling the meeting; and it was agreed to take as read the report and accounts, of which the principal features have already been published (*ante*, p. 421).

The CHAIRMAN first expressed regret at the absence of the Chairman of the Company (Mr. John Aird, M.P.), who was unavoidably detained abroad. Proceeding, he said the working of the undertaking during the past year had not brought out quite such a satisfactory result as they had been accustomed to; and it seemed as though there had been a momentary check to the tide of prosperity which had attended the Company for many years past. But they had every reason to hope that it was only temporary, and that they would still continue to increase, as they had been doing hitherto, the receipts both for gas and water. The result of the past year's business was that the Board were unable, much to their regret, to recommend quite the same rate of distribution as had of late years been customary. They proposed the declaration of the same dividend, but not quite the same bonus. A note which had been published for many years in the accounts gave the keynote of the reason for this diminution. It said: "By the eleventh Article of the Concession, the fixed annual payment for the water supply in Cagliari is: For the first thirty years, from 1867 to March 19, 1897, £9600; for the second thirty years, from March 20, 1897, to March 19, 1927, £7600; and for the third thirty years from March 20, 1927, to March 19, 1957, £5600." So that last year there came into effect the diminution of £2000 a year in the sum paid to the Company by the Consorzio for the water supplied. This, as would be seen, was practically the measure of the falling off in the receipts in the past year. They had made a little improvement as he would explain later; but, speaking generally, the reduction in the annual payment had been the cause why the results had not come out quite as they would have liked them. Comparing the accounts with those for 1896, the expenditure had on the whole been rather less than in the previous year—viz., £11,300, as against £11,600; but in the details of this outlay, there had been a good deal of difference. For instance, the expenditure on the water-works had been less than in the previous year, as might be expected considering that in 1896 there was a water famine, which gave a good deal of trouble to the Company. On the other hand, the expenditure in relation to gas manufacture had been more in the past year than in 1896—this being partly due to the cost of freight, increased outlay on coal, and other minor matters. The rates and taxes in Cagliari were also higher last year. It might have been supposed that these would have been less as the revenue had not been so large. But he must explain that the rates and taxes paid last year were based upon the declaration in 1896 of the profits of 1895; so that the taxes payable now were for their record year of 1895. The general charges in London remained about the same; but they had made a considerable gain in exchange on remittances this year. The loss was only about £900 as

against £1600 in the preceding year; the exchange for remittances from Italy having been far more favourable than it was. The total result was that the expenditure came out a little less than in 1896. On the other hand, the receipts were materially less, owing to the diminution of the annuity receivable for the water supply. The amount of the annuity was about £8000, as against £9600. As he had mentioned, the reduction for the second thirty years was to £7600; and the reason for the difference between this sum and the £8000 was that the reduction did not have full effect until March 20. The "extra" water supply in Cagliari had been somewhat less than in the previous year, probably owing to the water famine in 1896 having taught the consumers the lesson of economy. The receipts for supply beyond Cagliari had risen; and they hoped they would continue to increase in the villages as the water became more appreciated. Coming to the gas accounts, the position was very little in advance of 1896. This comparatively stationary state of the revenue from gas had received a good deal of consideration from the Directors. Until 1893, there was a continuous improvement in the gas revenue; and although there was on one occasion since then an advance of a substantial character, it was from a temporary cause only. From 1893, there had been hardly any increase in the consumption; and this had impressed the Directors with the idea that the time had arrived when some fresh stimulus was required. Therefore, after careful consideration, they had decided to make a reduction in the price of gas for cooking and heating purposes. This appeared to be a practice that was very common on the Continent; and in Italy, as in other countries, numerous towns enjoyed the advantage of a reduced charge for the gas supplied for cooking and heating. One could understand that in a warm country like Italy, the use of gas for heating would be resorted to in preference to coal where possible, and if consistent with economy. The Directors had accordingly lowered the price for heating and cooking by one-third, which seemed to be the ratio of reduction made by other companies; and they hoped this would lead to a considerably increased consumption and a corresponding profit. At present, the consumption of gas for cooking and heating was very small in Cagliari—so very small that, even if the experiment did not succeed, the loss which it would involve would be infinitesimal. As he had said, the net profit for the year was less than 1896. They had, however, earned their dividend of 7 per cent. for the year, and a little more; but they had to dip into the balance brought forward from the preceding year to pay the bonus of 2s. 6d. per share. But the Directors did not think it would be quite good policy, until they saw some more elasticity in the revenue, to dip into this balance to a larger extent. He hoped the shareholders would take the same view. They had no surplus capital; and the Directors had looked to the bringing forward of a sufficient sum from year to year as a sound policy, in order that they might have a certain amount of money in hand against emergencies. There was an item on the debtor side of the capital account and balance-sheet, "Services and meters (suspense account), £354;" and as they had no available capital, it was proposed to wipe this sum off by spreading it over three or four years' revenue. Having mentioned that the gas unaccounted for last year was only 4 per cent., as against 4½ per cent. in 1896, he referred to the Company's electric lighting installation, which, he said, was at present on a very modest scale; but still it had resulted in a small profit. Concluding, he remarked that during the year they had had the misfortune to lose their colleague, Mr. J. Orwell Phillips. His great experience of matters relating to gas supply, in consequence of his connection with The Gaslight and Coke Company, was of great value to the Board, at whose meetings he was a regular attendant. The vacancy had been filled by the appointment of Mr. W. R. Galbraith, who stood in the front rank of his profession as a Civil Engineer.

Sir Frederick Wigan, Bart., seconded the motion, which was unanimously carried.

On the motion of the Chairman, seconded by Mr. C. A. Swinburne, a resolution was passed confirming the payment of the interim dividend of 6 per cent. per annum, and declaring one at the rate of 8 per cent. for the past half year, together with a bonus of 2s. 6d. per share.

The retiring Directors (Messrs. S. Simmelkjor and J. J. Barrow) and the Auditors (Messrs. H. Bishop and R. S. Robb) were re-elected.

On the motion of Mr. Burney, a vote of thanks was passed to the Chairman and Directors and to the officers.

ELECTRIC LIGHTING NOTES.

The Bath electric lighting works have been in the hands of the Corporation about a twelvemonth; and the accounts (for the year less seven days) show a net profit of £645. In addition, £600 has been set aside for depreciation, and £707 paid for bank interest.

All the electric lights in Yarmouth were on Saturday night suddenly extinguished, consequent on an explosion in the generating station, where two engines were wrecked, through the condensers having been blown out. The works have a capacity for supplying about 14,000 lamps. The street lighting was subsequently restored; but the service to private users, mostly for shops, failed. Some days will be occupied in repairs before the private service can be again available. Traders transacted Saturday night's business by means of candles and lamps.

The Gloucester City Council decided last Tuesday to purchase the Bearland Estate for the purposes of their electricity and dust destructor works. On behalf of the Corporation, the Mayor (Alderman Estcourt) has entered into a provisional contract with the owner to buy the property, subject to the leases and tenancies, at the price of £7125. The Corporation will derive a rental of £236 from the premises on the estate. The Council also accepted several tenders for plant, amounting in all to about £25,000, subject to the necessary loans being sanctioned by the Local Government Board.

The Exeter Electric Lighting Committee have presented to the Corporation a summary of their returns for 1897. The revenue account showed a balance of £1222 in favour of the undertaking; the gross profit being £1843. After meeting the demands for sinking fund and interest, it was recommended that £750 be placed to a reserve fund, carrying forward £78. Mr. Domville, in moving the adoption of the report, said the Committee were proud to be able to say their work had been carried out without calling for a penny from the rates. Within a short time, they hoped to be able to devote some of the profits to a reduction of the cost of the light. They regretted the delay in arranging the street lighting, but their difficulties were nearly at an end. The report was adopted.

The Coventry Electric Lighting Department has made little improvement financially during the past year—the result of the trading being a net charge on the rates of £1558, as against £1706 twelve months ago. The number of consumers has increased during the year from 72 to 100; and the lamps connected, from 5662 (8-candle power) to 8149. The number of units sold has increased from 51,114 to 79,583; and the revenue from the sale of current and meter-rental, from £1245 to £1958. The profit on working is £106, as compared with a loss last year of £41. But against the profit of £106 has to be set the charge for interest on capital £860, temporary loans £27, and payment to stock redemption fund £777—together amounting to £1664.

The Borough Surveyor of Hanley (Mr. J. Lobley), in conjunction with Messrs. C. A. Cowell and C. J. Sutherland, the Electrical Engineers and joint Managers of the electric light undertaking of the Corporation, has prepared a report on the third complete year's working. The various loans sanctioned amount to £60,990; and the sinking fund and the interest thereon come to £2642. Last year the capital expenditure was £7491, principally for mains, transformers, and meters, and a new set of 34 arc lamps and posts; bringing up the total to £51,634. The expenditure on revenue account was £4000; the receipts being £6520—leaving £2520 as the gross profit, or equal to 4·88 per cent. on the capital expended. The reporters state that the receipts do not show such an increased consumption as was hoped for by the reduction in price from 6d. to 5d. per unit—in fact, the customers who formerly paid 6d., taken collectively, and of course including Corporation buildings, consumed less current in 1897 than in 1896. This seems to show conclusively that a much greater inducement was necessary to bring in long-hour consumers. This has now been given; but, owing to hesitation on the part of intending customers, the good results may not, it is remarked, come immediately. The sliding-scale system of charging came into operation on the 1st of January last.

Evidence of the continued extension of electric lighting in Birmingham is supplied by the annual report of the Electric Supply Company. It shows that the net profit for the past year (including a balance of £1042 brought forward) is £13,656. After placing £4460 to the credit of the depreciation reserve fund, the Directors recommend the payment of a dividend of 5 per cent., absorbing £8206, and carrying forward a balance of £989. On the issue of the remaining portion of capital authorized, a premium of £5475 has been obtained. Out of this the Directors have added £3367 to the special reserve against Provisional Orders; and with this the cost of the Orders, amounting to £4027, is now fully provided for. The balance of the above premium, amounting to £2108, has been carried to the general reserve fund. On making the above appropriations, the total reserves and undivided profits will reach the sum of £22,536. The number of 16-candle power lamps, or their equivalent, on order on Dec. 31, 1896, was 25,876; and on the same date in 1897, it was 39,232. The additions since the close of the financial year have brought the number up to 40,707. Early last year, a reduction in the charges was introduced, which slightly decreased the revenue per unit; but it has been amply justified by the increased demand for current. The expenditure on capital account during the twelvemonth was £35,250; and the Directors now propose to increase the capital by the creation of 20,000 additional shares of £5 each.

At the last meeting of the Bedford Town Council, the Electric Light Committee presented their third annual report. It showed receipts to the amount of £3200 from the sale of current at 6d. per unit, and of £1391 from public lighting; the total revenue being £4718. The receipts for current in 1896 were £2138. The chief item of expenditure was fuel, £1321, including carting. There was a profit on the net revenue account of £1593; but after repaying loans and interest, £2793, there remained a deficiency of £1200. Alderman Richards, the Chairman of the Committee, in moving the adoption of the report, explained that the charge for public lighting was the same as for gas; and they had always worked on the principle of not getting any profit on street lighting—their whole object being to serve the ratepayers. They started the light in a restricted area, and if they had kept to it they would have made a grand profit; but they did not start it for the good of the favoured few, but for the general benefit. It was a great success; and he hoped the Corporation and the public were satisfied. During 1897 the output had gone up 62 per cent., and they had 360 private consumers; while there had been an increase of 2850 8-candle power lamps for private lighting. Mr. Burridge stated that the Liberal Club in Bedford used to pay £86 for gas in the year, and they now paid £42 for electric light and £6 for gas. Alderman Jessopp said he considered this a remarkable exception to the rule. It was the first case he had heard of in which electricity was cheaper than gas. The report was adopted.

The electric lighting accounts of the Worcester Corporation for 1897 have been published; but (says a local contemporary) the finances are not particularly brilliant from a ratepayer's point of view. On revenue account the total is £6291, against £4757 in the previous year. The sale of current produced £4682, against £3767. The receipts for public lighting were £1265, as compared with £712, which, presumably, is due in part to the increase in the number of street-lamps. Miscellaneous receipts bring up the total to £6291, against £4757. Yet, despite an increase of revenue amounting to £1534, there is a loss on the year of £1474 odd! The working expenses have risen from £3155 to £4096; the principal item being coal, which has advanced from £886 to £1327. Another big item is that for repairs—£613, against £108! Attention to, and maintenance of, public lamps cost £341, against £214. The difference between the revenue and the actual working outlay is £2195, against £1602 in 1896; but the net revenue account shows that this is insufficient to meet the outgoings for interest on stock (£1946, against £1740) and for sinking fund (£1723, against £1478)—the total of these two items for 1897 being £3669. Consequently, with only £2195 to meet it, the deficiency is £1474. The enterprise, it will be perceived, has not even earned the interest payable by nearly £500, to say nothing of depreciation—a word which is not to be found in the accounts. The loss in 1895 was £1443; and in 1896, £1616. The electricity generated was 559,275 units, of which there were used for public lamps 83,700 units; sold to private consumers, 325,130 units; used in works, 5155 units; quantity not accounted for, 145,290 units, or more than one-fourth of the total! Thus, roughly speaking, for about 25 per cent. of the expenditure,

representing £1000, there is no return whatever! In 1896 the quantity generated was 424,221 units; the quantity unaccounted for 84,942 units. The average price obtained for the supply for lighting purposes was 4·27d. per unit, compared with 4·079d. in 1896. The number of lamps in use increased during the year from 21,958 to 24,712. Thus, although the business has been greatly extended, and a better price has been obtained per unit, the loss has been only £142 less than it was in 1896. Last year a table was provided showing the value of steam and of water power respectively; but this year it is omitted. Why?

Although not formally presented at the meeting of the City Council last Tuesday, the above accounts came in for some severe criticism, on a motion (which was lost) that the Committee should furnish further specified information. One of the speakers—Mr. Charge—had drawn up a tabulated statement showing the exact cost of lighting the streets and public buildings in 1894, when gas was employed, and in 1897, when electricity was used. The comparison is striking; and we reproduce it for the information of our readers—

	1894. Gas.	1897. Electricity.	Increase.
Guildhall	£69 16 5	£156 5 0	£86 8 7
Public Hall	52 8 6	104 9 0	52 0 6
Police Station	39 11 0	44 15 0	5 4 0
Market House	47 3 4	80 3 0	32 19 8
Town Clock	6 15 7	25 15 0	18 19 5
Water-Works	30 11 8	74 7 8	43 16 0
110 lamps displaced by 55 arc lamps	330 0 0	1265 15 0	935 15 0
Water-works motors	220 19 0	650 10 0	429 11 0
Totals	£797 5 6	£2401 19 8	£1604 14 2

THE SULPHATE OF AMMONIA COMMITTEE.

In the course of the article on the work of the Sulphate of Ammonia Committee which appeared in the "JOURNAL" for the 1st ult., it was mentioned that one of the steps being taken by the Executive to disseminate knowledge among agriculturists regarding the superior value of sulphate of ammonia compared with other nitrogenous manures was the preparation of two pamphlets on the subject—one by Mr. John Hunter, F.I.C., F.C.S., and the other by Mr. C. Middleton, a practical farmer in Yorkshire. These have since been printed, and several thousands put into circulation. For distribution in their own districts, the subscribers to the Committee have been furnished with supplies of copies, on the wrappers of which many of them have had the announcement printed: "The present price of sulphate of ammonia, and any further information may be obtained upon application to ——." The pamphlets have been written in a clear style, and are free from the dry detail with which authors of this class of literature too frequently cumber their compositions. The one by Mr. Hunter is certainly worth perusal not only by users, but by makers, of sulphate of ammonia; and, for the benefit of our readers, we have pleasure in reproducing it. It is entitled—

THE SCIENCE OF MANURING.

Every agriculturist who has learned how it is that nitrogenous constituents may be accumulated in soils by growing a leguminous crop, such as clover, peas, beans, tares, &c., notwithstanding the fact that these crops are themselves highly nitrogenous, has learned a part at least of what is now regarded as the "new soil science." It was wont to be believed that leguminous crops removed large proportions of nitrogen from the soil; but we now know that most, if not all, of that nitrogen is taken from the atmosphere, and that the soil is left richer in nitrogen, and not poorer, by the growth of these crops. This all-important condition is brought about by micro-organisms, which are to be found in the warts or nodules in symbiosis on the roots of every growing leguminous plant. We have now to realize that no matter how important those leguminous organisms are, they are helpless by themselves—that is to say, they must have certain other groups of organisms, as co-workers, because without these, the leguminous organisms are practically helpless.

These doctrines apply of course to every crop, for according to "Chambers' Encyclopædia" "a sterile soil must be an infertile soil, as without the presence of these groups of advantageous soil organisms, no crop—no matter what it is—can be grown under ordinary conditions in the field. The doctrines which obtained until recent years went to show that manures applied to soils were used by plants as foods directly. The newer science proves that only indirectly do manurial substances nourish plants—that, in fact, manures are in reality the foods of soil organisms, and that plants feed upon the soluble stuffs which are manufactured in the soil by these organisms.

It is now pretty generally known that in growing a leguminous crop on land under any ordinary rotation, it is unnecessary to use nitrogenous manures; but it is not generally known that the leguminosæ are directly and positively injured in only too many cases because of errors in manuring, errors which are almost invariably, but erroneously, ascribed to "shading."

The careful consideration of the bacteriological conditions and contents of soils is of the utmost importance to agriculturists and to landowners. It has been recognized at every experimental station on the continents of Europe and America; and it does seem strange that, although this "new soil science" had its origin in our own country, we are among the last to put it into general practice. It is not stating the case too strongly when we say that, until this science is studied so as to be properly understood, rational and profitable manuring is impossible; crops possessing the best feeding and malting qualities will not be raised, while the soil may be left—and is too often left—in a state of comparative infertility.

At the agricultural research station on Lord Rosebery's estate of Dalmeny, the treatment of soils on bacteriological lines has been the chief study; and so successful have the experiments proved, that the whole estate is now being worked on the new lines. In these experiments, every variety of natural and artificial manures has been put to the test; and we are given to understand that a full report of the results is being published. A few of these results have already reached the agricultural press; and from these, many valuable and interesting lessons are to be learned. For example, all the available sources of nitrogen have been put to the test. Under this head are included Peruvian guano, Ichaboe guano ("both of which contain ammonia salts, but are deficient in sulphates"), bone manures, nitrate of soda, nitrate of potash, and nitrate of ammonia, farmyard manure, shoddy, dried blood, and sulphate of ammonia. In every case where comparisons were made, the conditions were as nearly as possible identical—that is to say, in some cases the nitrogenous manures were compared alone on the same soil; while in others they were compared in conjunction with farmyard manure, or with farmyard manure combined with phosphates and potash salts. In all these tests the most satisfactory results have been obtained from the employment of sulphate of ammonia.

Sulphate of ammonia on hay gives as large a crop as that obtained by any other nitrogenous manure. It generally gives a larger crop; but it always gives a crop possessing distinctly superior feeding qualities, while the hay will not produce that diabetic condition which veterinary experts and owners of studs are now recognizing as being due to the feeding of horses on improperly grown, or abnormally forced, hay.

Oats grown with sulphate of ammonia will generally give a large crop, with greater weight per bushel, and possessing superior feeding power.

The results with wheat agree entirely with those obtained in oat culture.

Barley is greatly favoured by sulphate of ammonia; and this important feature ought to be carefully noted by barley growers—viz., that the malting quality is superior when barley is grown by the aid of sulphate of ammonia than when any other artificial manure of the nitrogen class, or even if heavy and costly dressings of farmyard manure, are used.

On every grain plot—oats, barley, and wheat—one highly important observation of previous years' trials is more than confirmed; and agriculturists cannot well afford to overlook it. The plots were as nearly as possible the same; the treatment was identical in each comparative test, excepting in so far as sulphate of ammonia was compared with other descriptions of nitrogen-containing manures; and, notwithstanding the fact that the sulphate of ammonia plots were the more exposed to the winds, in every case they were standing erect, while the other plots were more or less "laid"—*i.e.*, lodged. The fact that the laid plots were actually protected from the prevailing winds by the sulphate of ammonia plots, and that the crops on the laid plots were not heavier than the others, shows a value that ought to be appreciated by agriculturists.

As to the turnip plots, in every case sulphate of ammonia gives the heaviest crop, yielding the highest albuminoid ratio and the best feeding and milk-producing qualities. Sulphate of ammonia grown turnips, moreover, exhibit, when cut, "a denseness of flesh" right to the heart, which is not exhibited in any other case where nitrogen-containing artificial manure is employed. The keeping qualities have also been proved to be so distinctly superior that no other artificial source is now employed on the Dalmeny Estate than sulphate of ammonia. In the turnip competition at the recent show of the Scottish National Fat Stock Club, where there were many exhibits from all the best turnip-growing counties of Scotland, the first and second prizes and the champion cup were gained by turnips grown with sulphate of ammonia.

On the potato crop results have been obtained agreeing in every respect with those obtained in turnip culture, whether on the plots or in the field. From the "North British Agriculturist," we learn that one field of potatoes at Dalmeny yielded in 1896, 19½ tons per acre, and that from every acre 18 tons were of marketable size. This season—a poor one for potatoes—the same variety, "Up to date," has yielded from 14 to 16 tons per acre. Sulphate of ammonia was the only artificial nitrogenous manure employed in those cases; no other being now used in their farm practice.

Lord Londonderry, in an address delivered on Dec. 31, 1897, to the Darlington Chamber of Agriculture, remarked, when speaking of potato culture and the crop of the past season: "I have heard of one case where a farmer, paying slightly under £1000 rental, has sold 66 acres at £38 per acre; and this is accomplished by liberal farming, as follows: 30 tons of farmyard manure per acre applied in the autumn, 1 ton of ground lime, when the soil is tilled in the early spring, then 1 cwt. of sulphate of ammonia, and 3 cwt. sulphate of potash applied at time of planting, and by paying attention to proper rotation. My object in mentioning the above facts is that I thought they might be of use and interest to you." That is by no means an isolated case, but is only one of a number which could be quoted where farmers, who have accepted the teachings of science, are reaping the benefit. The farmer to whom Lord Londonderry referred has this season refused an offer of 36s. per quarter for his wheat "thrashed off the stook." The crop was a heavy one, and of fine quality, and was also grown by sulphate of ammonia.

In sugar-beet culture, Continental growers have realized that, by substituting what appeared to be cheaper materials for sulphate of ammonia, they have made a lamentable blunder. They have consequently returned to sulphate of ammonia of necessity, with the result that all the accumulated stocks of last year have been disposed of; and there can be no doubt whatever as to the reasons of this—viz., first, the experience of beet growers; and, secondly, the wider dissemination of agricultural scientific knowledge. It has been proved both at home and abroad that, where sulphate of ammonia has been employed in growing either sugar beets or sugar canes, the best results have been obtained not only as regards the quantity of sugar yielded by the plants, but also in the percentage of crystallizable and more marketable sugar.

The hop crop is undoubtedly benefited more by sulphate of ammonia than by any other material of its class. Of course, this crop requires special treatment, with which growers should be familiar; but the statement here made in reference to sulphate of ammonia is simply a scientific fact, which home growers must learn to appreciate, if they are to hold their own in the markets of their own country.

Sulphate of ammonia is very advantageous to most soil organisms. It is converted by these organisms into nitrate of lime—a process which goes on continuously, though slowly, whereby, during the period of growth, the plants derive a constant supply of highly important constituents.

In fruit culture, sulphate of ammonia is very valuable. Fruit growers ought also to be made aware that in fruit formation magnesia has very special functions, and that without the use of an available salt of magnesia along with sulphate of ammonia, the much-desired juiciness and quality can seldom be obtained.

In the foregoing remarks, referring specially to sulphate of ammonia, it must be clearly understood that the views expressed pre-suppose the simultaneous use of an adequate amount of phosphates and of potash,

and that farmyard manure is employed, unless the soil contains already sufficient organic matter.

Another highly important fact cannot, and must not, be overlooked. On every soil, except on chalky land, or on shallow limestone soils, lime compounds are almost invariably in too small a proportion. These compounds are constantly being removed from soils in larger proportion than any other of the so-called plant essentials. Consequently it is of the first importance in good husbandry that lime compounds be maintained in the surface soil; and these are most profitably added in the form of "compost." Liming, as generally practised, is unwise, and is absolutely at variance with the new and true science of agriculture. On the other hand, if lime is composted, and is used judiciously along with sulphate of ammonia, phosphates and potash, and common salt where necessary, success and profit will replace non-success and loss; while "the land, the landowner, and the purchaser of wheat, barley, hay, potatoes, and turnips will not be robbed." Ground quicklime or slaked lime may be used in place of "compost," if the lime be applied when the land is being worked in the spring; but whether it is quicklime or composted lime, the amount to be applied per acre should not exceed 4 cwt., unless under competent advice.

The views which have here been expressed regarding the comparative worth of crops, grown by the valuable organic substance sulphate of ammonia, are not based on any frivolous opinion or interested experiments. They are the simple unvarnished facts, gathered from trials and experiments conducted all over our own country, and in other countries besides. Confirmation of this statement requires it to be merely mentioned who the experimenters are, or where the experiments were made: The Midland Dairy Institute, West Lothian Farmers' Club, Scottish National Fat Stock Club, Dalmeny Experi nental Station, &c.

We have referred to the experimental station organized and conducted by Lord Rosebery on his Home Farm at Dalmeny. These experiments were made to test the accuracy of the doctrines laid down by the authors of the "new soil science." The repeated tests have so absolutely confirmed every point, that Lord Rosebery's Farms are now worked wholly on bacteriological lines. The crops raised at Dalmeny compare more than favourably with those raised in any other part of the country; and, what is of equal importance from what we gather from published statements, these bumper crops have been obtained at a material reduction in cost. We take it from the "North British Agriculturist," as being a fact, that Lord Rosebery's crops from his Home Farm have been not only conspicuous in quantity, but that the quality is also so manifest that practically everything that is raised on the Dalmeny estate is now disposed of as seed all over the British Isles, and even on the Continent. From the same source, we quote the following important statement: "As the result of these experiments, which are of national importance, not one ounce of nitrate of soda is now employed on the estate, except the few hundredweight which are necessarily used on the experimental station for comparison."

These are the conclusions arrived at on what is regarded as one of the most carefully conducted, scientific, and practical experimental stations in Britain. The work and expense of conducting this important station has been borne by Lord Rosebery; and we are led by the agricultural press to believe that his Lordship is to put the country under a further indebtedness to him by his publishing the results obtained at Dalmeny. From the results which have already from time to time been given publicity to, we are entitled to gather that the most successful source of nitrogen is that which again must take its old place as the standard by which all other sources of nitrogen and nitrates will be judged—viz., sulphate of ammonia.

It is important that agriculturists should realize the actual percentages of nitrogen in the materials most commonly employed as a source of nitrogen or of ammonia. Peruvian guano (as imported during 1897) contained about 8 per cent. of nitrogen; nitrate of soda (95 per cent.) contains 15·48 per cent. of nitrogen; sulphate of ammonia contains 20·17 per cent. of nitrogen.

The unit value of nitrogen during 1897 from Peruvian guano was 14s. 6d.; and from sulphate of ammonia, about 7s. The cost therefore of 8 per cent. nitrogen from Peruvian guano was £5 16s.; of 8 per cent. nitrogen from sulphate of ammonia, £2 16s.—or a difference in favour of sulphate of ammonia of £3 on 8 per cent. nitrogen, which is equal to nearly £7 per ton on every ton of sulphate of ammonia. This is a fact which has caused amazement in those who have taken the trouble to make the simple calculation. In like manner, if we take nitrate of soda containing 15·48 per cent. of nitrogen as selling at £7 10s. per ton, sulphate of ammonia with its 20·17 per cent. of nitrogen, and calculated at the same unit value, is worth £9 15s. per ton, or an advantage in favour of sulphate of ammonia of £2 5s. This is simply the difference in the calculated values, and is independent of the greater advantages in quality and quantity of crop.

In the light of all the facts stated in this pamphlet, the comparative cheapness of sulphate of ammonia, and the conspicuously better results obtained by its use, when tested on such a variety of crops, it seems incomprehensible that British farmers should go to Chili and Peru for their supply of nitrogen; while at home we are manufacturing a valuable material which is being eagerly taken from us by Continental agriculturists, who—benefiting by the greater scientific knowledge acquired from the numerous experimental stations—have learned, thus early, upon what to rely for the raising of good crops and realizing profits.

Free Water Supply for Horsley.—The seal of the Belper District Council has lately been attached to a deed whereby Mr. Sitwell, a large land and property owner in Derbyshire, undertakes to provide a free water supply to the inhabitants of Horsley. He defrays the entire cost, amounting to about £1000. He agrees to give the ground for a storage reservoir for a considerable population in the district of Heanor.

The Concession of the Beyrout Water Company has lately been extended for forty years. In return for this extension, the Company undertake to reduce their tariff, to supply gratuitously 55,000 gallons of water daily to the public establishments, to abandon for the remaining years of the present concession one-half (30,000 frs.) of the subvention received from the Municipality, and to reduce it to 15,000 frs. for the forty years of the new concession.

THE METROPOLITAN WATER SUPPLY COMMISSION.

Twelfth Day—Monday, Feb. 21.

(*Viscount* LLANDAFF, *Chairman*, *Sir* JOHN E. DORINGTON, Bart., M.P., *Major-Gen.* A. DE COURCY SCOTT, R.E., *Rt. Hon.* J. W. MELLOR, Q.C., M.P., *Mr.* A. DE BOCK PORTER, C.B., *Mr.* H. W. CRIPPS, Q.C., *and Mr.* R. LEWIS.)

The Commission sat in Committee Room "A" of the House of Lords; the Moses Room being otherwise engaged.

The following are the Counsel engaged: Mr. POPE, Q.C., and Mr. CLAUDE BAGGALLAY, Q.C., for the New River Company; Mr. LITTLER, Q.C., and Mr. LEWIS COWARD for the Kent Water Company; Mr. PEMBER, Q.C., for the Lambeth, East London, Grand Junction, and West Middlesex Water Companies; Mr. RICKARDS for the Chelsea Water Company; Lord R. CECIL for the Hertfordshire County Council; Mr. BALFOUR BROWNE, Q.C., and Mr. FREEMAN, Q.C., for the London County Council; Sir R. NICHOLSON for the Middlesex County Council; and Mr. GABRIEL P. GOLDNEY (Remembrancer) for the Corporation of the City of London. The Southwark and Vauxhall Water Company are represented by MESSRS. BIRCHAM AND CO.

Mr. *Gomme*, further examined, handed in a table in completion of his information regarding the results of the purchase by the Glasgow Corporation of the water supply. The table, the basis of which had been supplied him by the Corporation, went back to 1848-9, and gave for each year the revenue and expenditure, the balance or deficit, the balance applicable to sinking fund and reduction of rates, the actual amount devoted to sinking fund, and the rates charged north and south of the Clyde and outside the Municipality. It appeared that, since 1856-7, a public water-rate of 1d. had been charged; but this, he said, could not be called a rate-in-aid, as it was charged in some years when there was a surplus. He thought there were no cases in which the public water-rate was paid by any non-consumer. Thus the Railway Companies were not charged with this rate.

The CHAIRMAN said several questions had been asked by a member of the Commission as to the rates in the pound charged by the various Companies; and Mr. Pember rather challenged what the member said. They had therefore had prepared a table of the rates, as far as they could gather them, for houses of rentals ranging from £10 to £50. For a £30 house, the percentage in the case of the Chelsea, Grand Junction, New River, and West Middlesex Companies was 4 per cent.; the Southwark and Vauxhall Company, 5 per cent.; the East London Company, 5 per cent.; the Kent Company, 9·4 per cent.; and the Lambeth Company, 12·2 per cent.

Cross-examined by Mr. LITTLER, witness said his evidence as to the revision of the relationship of capital to actual works must be a matter for an arbitrator to consider; but this evidence was directed more to the question of control.

Mr. LITTLER: Can you give us a case in which an arbitrator has ever done it?

Witness: I do not know about an arbitrator doing it; but it was done in the case of Ipswich in 1882.

In the case of Ipswich, there was an unusual claim, and the arbitrator cut it down?—There was a claim by the Company of £213,000 for the works.

Not on the basis of the income. Is not the invariable practice to take the income of the company, ascertain how far it is secured by the goodness or badness of the works and the company's condition, and then take a certain number of years' purchase, according to the value of the property?—No; I do not think it is. Pressed further to give instances, witness mentioned Middlesbrough and Birmingham; but he admitted that in the first case Parliament fixed the terms of purchase, while in the second it was by agreement.

Mr. POPE, in reply to the Chairman, said in the Ipswich case the Company claimed upon the capital value of their works, and not on their earning powers; the former being probably more favourable to them.

Witness remarked that what he wanted to bring out was that the claim was originally £213,000, and that during the negotiations £13,000 was deducted on account of the condition of the works. He did not suggest that the Company had acted illegally in paying dividends on capital which he held was obsolete.

Mr. LITTLER: Do you suggest that we should be deprived of that which is our absolute right to-day, without being compensated for it?

Witness: My answer is that if the Companies come to have a new lease of life under a system of control, then, in the interests of the consumers, Parliament should be asked to do what they did in 1852, and bring down the capital to the value of the actually existing works.

Do you know that all this was done in 1852, when it was admitted that certain things were charged to capital which ought not to have been?—No; that is not my reading of the evidence.

Do you know that the Kent Company, when asking for further powers in 1852, requested Parliament to fix their capital?—Yes.

Do you know that section 9 of that Act expressly provided that the sum to be the capital was the sum which you are now attacking to the extent of £75,000?—Yes. Witness went on to agree that this amount was included because, though the Company had issued shares in bad times at a discount, they had spent so much out of income that it was thought fair that these shares should be regarded as issued at par. He had separated the capital over sixty years old from that raised since then, because he thought the older capital should certainly be revised, with a view to eliminating what was obsolete.

Do you suggest then that, if we could show our capital is represented by works of much more value than the nominal amount spent on them, the Comptroller ought to put our capital up?—But it is not more. The greater value of your works is represented in increased dividends.

In further cross-examination as to the benefit which had accrued to the Kent Company from the increase in rateable value of property in London, witness said he was aware it had been only £4 per property in the last twenty years. He suggested that part of the increase was due to the quinquennial valuation; but he did not know that there had been 16,090 cases of increase and 15,854 cases of decrease in the portion of the Company's district which came within the quinquennial valuation, nor that the total decrease exceeded the amount of increase. He was also cross-examined

with regard to the accuracy of his figures as to the rateable value on which the Company based their charges. He was unaware that in one parish the Company charged according to rateable value on only about a fourth of the district as represented by rateable value.

Mr. LITTLER, with reference to the 3d. rate levied at Manchester by the Corporation, to which witness had referred, read a letter from the Manchester Corporation, in which they said they levied a public rate, but that it did not include a supply of water for any other purpose than extinguishing fires. Road watering and sewer flushing were paid for—the Sanitary Department paid the Water Department.

Witness remarked that he had given the information with which he had been supplied.

Major-General SCOTT: What is the 3d. for?

Mr. POPE: Nothing but fires.

Mr. MELLOR: Have you the amount raised by the 3d., and how it is spent?

The CHAIRMAN: It seems an enormous amount for fire only.

Mr. POPE: It is a rate levied upon the principle that the whole body of the community should pay for a certain portion of the water supply.

Mr. LITTLER: It is purely and simply a rate in aid of the Water Department; and the Water Department charges the other departments of the Corporation as a company would.

The CHAIRMAN (looking at the water accounts of the Corporation): I do not in the accounts find any receipt from the Sanitary Department.

Mr. LITTLER: I doubt whether such a small item would appear in a printed abstract.

Mr. PEMBER remarked that, under the Water-Works Clauses Act, no charge could be made for water used for fires.

Mr. LITTLER, replying to the Chairman, said probably the person who wrote the letter from the Manchester Corporation was unaware of the fact Mr. Pember had just mentioned.

Witness was then cross-examined with a view to showing that the charges of the Kent Company for water by meter in London compared favourably with those in a number of cases in the Provinces; and he made various admissions on this point. As to Bradford, he agreed that in a few instances only the charges were about the same as in London; while with regard to certain classes of property, they were considerably higher. With reference to the West-end and villa regions being better off in the matter of charges than the poorer parts of London, he also agreed that with such houses as there were in London up to £20 rateable value, it was a frequent occurrence to have two families living in the one house, who would use considerably more water than would be required in a £30 house where there would be only one family. In a great majority of provincial purchases, perpetual and not terminable annuities were given; there were only two considerable cases where they were redeemably—viz, Sheffield and Northampton, In every instance, too, mortgages on debentures were taken over by the purchasing authority.

By Mr. PEMBER: He said that on the expenditure side of the Lambeth Company's accounts there was £87,000 too much. The outlay was the same as the capital. When the capitals of the Companies were revised, the Lambeth claimed to have theirs put at £313,000. It was fixed at £226,000; and he suggested that on the various occasions when the Company had brought their capital forward, instead of the £226,000 being included in the expenditure, the £313,000 was so included. He could not say this positively; and he had therefore guarded himself in his previous evidence on the point.

Mr. PEMBER: If this is anything, it is a charge of fraud.

Mr. BALFOUR BROWNE: No, no; he said subject to explanation.

Witness (continuing) said his point was not as to the amount raised, but the amount included in the capital expenditure.

Mr. PEMBER: Supposing your accusation had been true, what is the value of it?

Witness: Simply that you would have £87,000 in your capital account to devote to works at the present moment.

That is not what you state. You say: Ever since that date, if I am to judge by the published figures, instead of bringing forward £226,000, £313,000 has been brought forward. Now you say it has not been brought forward as a matter of capital but that we have put our expenditure too high. How do you prove it? By taking every statement of the Company before the various Committees and Commissions, and ascertaining what they have brought forward.

How do you know that we have not spent that since 1848, either out of revenue or capital?—I do not know that you have not.

Mr. PEMBER said the charge was clear that Parliament knocked off the difference between £226,000 and £313,000 in 1848, and that the Company had sidled up to the £313,000 under the pretence that they had spent the money.

Mr. BALFOUR BROWNE said the witness put that forward as what the accounts showed; but he did not accuse the Company of fraud. He (the learned Counsel) wished to make no accusation of fraud. If Mr. Pember would put in a table showing that what witness said was wrong, the County Council would admit it.

Mr. PEMBER denied that there was anything to explain.

By Mr. RICKARDS: He said, in regard to the Chelsea Company, that they stated in their accounts for the year ended March 25, 1872, that the capital expended on works prior to their Act of 1852 was £364,959; whereas their capital had been limited under the Act of 1852 to £300,000. He was aware that the £64,960 was part of £80,000 which the Company had been authorized to borrow. The point was that in 1852, before the Committee, the Company put in a statement of their capital expenditure giving the cost (not the value) of the works then in use as £304,000. The Company showed that they had expended a sum of £400,000; and they volunteered to write off a certain amount as capital spent on obsolete works, thereby reducing their capital to £304,000.

Mr. RICKARDS: Will you take it from me that they have never paid their statutory dividend on that £64,959; that they have only paid the rate of interest fixed by their bonds—from 4 to 4½ per cent.?

Witness: I am quite prepared to accept that.

Mr. RICKARDS: Then it was not correct to say we were paying our statutory dividend on the £364,000.

The CHAIRMAN: We have now disposed of two of these items of excess. Who represents the Southwark and Vauxhall Company?

Mr. RICKARDS intimated that their representative was not present.

By Mr. G. PRIOR GOLDNEY: The rateable value of the City of London in 1896 was £4,481,869, and of the County of London £31,342,240—a total of £35,824,109. The rateable value of the City was therefore roughly one-eighth of the whole. If all the Companies were bought up, and the water charges were reduced to the level of those of the West Middlesex Company, who were charging the lowest rates, the loss of income would be about £161,000. If the rates were brought down to those the Company were actually charging, the loss would be much greater. The New River Company, if they charged their full rates, would take out of the City about £135,000 a year, which was about equal to a rate of 7½d. The New River Company, however, made reductions in the City; so that the £135,000 might be reduced to £100,000—equal to a 6d. rate. He did not agree that, if the Companies were bought by one authority, instead of the charges in the City being reduced to those actually charged by the West Middlesex Company, they would have to be levelled up to the statutory charges of the Company, because in all probability the same arrangement as now existed would be adhered to. If the rates were levelled up to the statutory charges of the West Middlesex Company—the New River Company's statutory rates being the same as those of the West Middlesex Company—the City would have to pay the £135,000 as above, or £35,000 a year more than at present. If there were a deficit of £161,000, the City would have to pay £20,000 further; if of £250,000 (the figure suggested as the result of reducing all the charges to the level of what the West Middlesex Company were actually charging), the City would have to pay £30,000 more. He still thought it was desirable, in the interests of the City, that the Companies should be acquired, because as years went on they would pay less and get a better water supply. The deficiency would be met by the increase which would take place in rateable value, and by the savings which could be effected by the concerns being managed by the County Council. Supposing an arrangement could be made for a supply by meter which would not cause the poor to pay more, he should still object to such a supply, because the principle of water taxation had been so generally accepted throughout the country. The supply of water was a supplement to other municipal services which they could not dissociate from the principle of taxation. It was, in reality, a sanitary service to a larger extent than it was domestic.

By the CHAIRMAN: The City of London had at present some arrangement by which the New River Company charged in the City less than the statutory rate.

The CHAIRMAN: Do you think that the County Council, if they became the purchasers, ought to continue these financial arrangements?

Witness: I do not say they should continue them; I do not know what they are. I think they would seriously consider them. He did not object to variations in the rate of charge in different classes of property; but he did object to the spasmodic way in which these differences were now made. If, as in the City of London, there were what were known as "lock-up" premises, some difference should be made in the charge on them.

Witness having been briefly re-examined, the Committee adjourned.

Thirteenth Day—Monday, Feb. 28.

The inquiry was resumed to-day, all the Commissioners being present.

Mr. *W. H. Dickinson*, examined by the CHAIRMAN, said he had been a member of the County Council since the first election in 1889, and Chairman of the Water Committee for the past three years. In March, 1889, the Council took up the question of the water supply of the Metropolis, and referred the matter to a Special Committee. They found, however, that they had no power to spend money to promote Bills; and the matter therefore was not proceeded with till 1890, when the Council obtained power to inquire. A Committee was appointed and authorized to enter into negotiations with the Water Companies; but nothing definite followed. In January, 1892, the Council appealed to the Government to inquire into the adequacy of the water supply; and in the result Lord Balfour's Commission was appointed. Meanwhile, in 1891 two Bills were introduced—one by the City Corporation, and another by the Vestries. Both were referred to Sir M. W. Ridley's Committee, and for various reasons rejected. The policy of the Council had been to follow the recommendations of Sir M. W. Ridley's Committee. The report made by Sir M. W. Ridley's Committee came before the Council; and in October, 1891, certain recommendations were made. He agreed that, in the report of Sept. 22, 1891, accompanying these recommendations, there was a statement to the effect that it was no exaggeration to say that London might be made to pay £30,000,000 or £40,000,000 in purchasing the undertakings of the Companies, and might then find itself obliged to spend from £10,000,000 to £20,000,000 more in providing a new supply. This would in all probability be the result of an obligatory and immediate purchase on arbitration terms; and such a purchase must therefore be resisted at all hazards. The origin of this statement, he explained, was that the purchase should be under the Lands Clauses Act, as proposed in the Vestries Bill, and with which he disagreed. Witness went on to refer in great detail to the voluminous reports which had been presented to the County Council from time to time, and to the steps which they had taken on the water question. In order to get at the true value of the undertakings, he held that there were circumstances to be considered which were beyond the provinces of an ordinary arbitrator.

The CHAIRMAN: In 1894, a report was presented to the Council. In it, did these words occur: "I have attempted to estimate what will be the financial result of purchase at £30,000,000; and I find that to provide the annual expenditure and repayment of capital, the present water-rates over the whole area of Water London will have to be increased by at least 30 per cent.?"

Witness: That is not in a report to the Council. I think you are referring to a paper headed "Memorandum by the Deputy-Chairman."

Who was the Deputy-Chairman?—Myself. Witness went on to explain that this was a Memorandum, drawn up at the request of the Water Committee, of proposals which he had made to that Committee as one view of a problem which was of such magnitude and importance to the people of London that in his opinion it could not be solved equitably to the ratepayers by the simple expedient of ordinary purchase. The practical question before the Committee was: Should the Council purchase the Companies upon terms of arbitration? In the memorandum, he took it for granted that the figure an arbitrator would name would be not less than £30,000,000. He did not see how any arbitrator could

under the present law, do otherwise than assess the value on the basis of present income. Only Parliament could adopt any other plan. He also took it for granted that the report of the Royal Commission proved that the Thames and Lea would suffice till 1931, but not afterwards; that a very large capital expenditure would be necessary to make the Thames and Lea water sufficient in quality and quantity; that it was uncertain whether the scheme of reservoirs in the Upper Thames would provide sufficient water, the Commissioners having over-estimated the amount of water that would be available at Staines for filling these reservoirs; that a much improved system of supervision must be inaugurated to ensure the quality of the water; that no large quantity of underground water could be obtained near London; and that at any time the Thames might be a source of disease. If these assumptions were correct, it seemed that those who now simply advised purchase, without regard to the future, were assuming a very grave responsibility. The effect of an immediate purchase would be that the London ratepayer would find his charges for water materially increased, as suggested by the Chairman in his quotation. The London ratepayer would not only have to supply his own 121 square miles with water, but also 500 square miles outside his area. Then a further expenditure, in a very few years, of some £20,000,000 might have to be incurred in abandoning the Thames as a source of supply, which would increase the rates by a further 6d. in the pound. Lastly, if the ratepayer did not at once resolve to abandon the river supply, he would have to expend large capital sums in forming reservoirs in the Thames and Lea Valleys. Much of this latter work would be experimental; for if the reservoirs were made, it was very doubtful if the water to fill them could be obtained, and, having been obtained, whether it would be wholesome after long storage. He would therefore leave the Water Companies to carry out the recommendations of the Royal Commission, and do all that was necessary for supplying water to London for forty years. As shown by the Commission, their capacity to do so would cease in 1931; and then the Municipality of London would take over the whole supply. He suggested that Parliament should enact that the powers and obligations of the Companies should continue as at present till 1931, subject to more efficient inspection as to quality, obligation to raise money by auction, and limitation of charges upon existing houses to the amounts now allowed; that the powers of the Companies should absolutely cease in 1931, in which year the Council should take over their undertakings, or so much as they required, paying for only the actual value of the plant and materials; and that at any time prior to 1931, the Council might agree with any Company to take over their undertaking. He also, in the memorandum, pointed out the advantages which would follow the adoption of these proposals. This document, he explained, was an expression of his personal opinion at the time. It was issued in confidence, and remained confidential for two or three years—until a member of the County Council moved that it be printed and circulated. At that time he thought purchase might result in a charge on the rates; but he had since come to the conclusion that he was absolutely wrong. If the price was fair, there would be no raising of the rates.

The CHAIRMAN: When you say a fair price, do you mean the arbitrator shall have power to consider all those matters that Lord Farrer said an ordinary arbitrator could not take into account?

Witness: Yes.

Sir G. BRUCE: Do you imagine that any arbitrator would give an award without taking into consideration the security of the dividend, and the possibility of its falling or even rising?

Witness: I think any arbitrator would take that into consideration.

Mr. PEMBER said there was only one thing an arbitrator would be unable to go into—the possibility of Parliament reducing the rates.

Witness remarked that the arbitrator might, for instance, also feel difficulty in going into the question of competition. He then went on to refer to the promotion of the eight Bills for the transfer of the Companies to the County Council. These contained the original arbitration clause, of which they had heard so much, and which the Council thought necessary to safeguard the interests of the consumers. One proviso of this clause referred to the legality of charges, together with the circumstances under which such powers of charge had been granted by Parliament. The Council had always contended that the power of rating was given to the Companies on the understanding that competition was an active force and tended to keep the charges reasonable.

The CHAIRMAN: Then you mean that the arbitrator was to disregard the direct enactments of the Companies' Acts of Parliament, and consider the charges were, or might be, limited by competition. Is that it?

Witness: Yes, that the charges would be cut down if one Company chose to compete against another, which we say was the intention of Parliament. The competition left existing by Parliament in 1852 has always, in our opinion, been a very important circumstance. In our view, some of the agreements between the Companies not to compete are illegal. The number of years' purchase would be greater in the case of a Company not liable to competition, than with one that was so liable. The County Council have always held that competition between the Companies was intended to operate, and that the mere existence of these agreements among the Companies to the contrary ought not to operate to increase the value of the concerns.

Mr. CRIPPS: Then it would be impossible for you to go to arbitration until another Act of Parliament has been passed?

Witness: Unless we can get an instruction which would allow the arbitrator to take all these matters into consideration generally.

Even that would require an Act of Parliament, I think?—Well, we should have an Act under any circumstances.

Asked what was meant by the provision in the clause that the arbitrator should consider the adjustment of the revenue accounts of the Companies in respect of repairs and renewals properly chargeable thereto, witness said the Commission had already had evidence that portions of the capital of the Companies were obsolete. If the Companies were to continue in existence their capital ought to be written down, the result of which would be to accelerate the arrival of the Companies at the payment of their 10 per cent., when the reduction of their charges must take place. Another proviso was that the arbitrator should have regard to the statutory powers of any Company to compete, and to the rights of any other body or company to supply water in the district, whether as now existing, under statute or otherwise, or as might be likely to exist in future. This was meant to cover competition by any other body, not necessarily by the County Council. The main points of the arbitration clause limiting back-dividends to six years, shut off the Companies from any assumed future increase of rateable value, and forbade any compensation in respect of compulsory sale.

Mr. PEMBER pointed out, in reference to the provisions as to future competition, that in the Transfer Bills of such of the Companies as had the clause that they should not be obliged to compete, the Council proposed to put in a clause repealing the non-competition one.

Witness (continuing) alluded to the conferences which were held in 1891 and 1894 between the County Council and the extra Metropolitan Authorities regarding arrangements for the ultimate administration of the water supply as between the City of London and the neighbouring Authorities. Eventually an agreement was made with Surrey and some other Authorities, on the basis that as far as practicable they should be left to manage their own affairs.

Mr. PEMBER said Surrey no longer assented to this arrangement.

Witness remarked that in 1895 the County Council introduced the eight Purchase Bills, which were referred to Lord Rathmore's Committee. This Committee refused to accept the details of the arbitration clause; but they accepted the first words, and the principle that the arbitration should not be under the Lands Clauses Act, though the arbitrator might, if he thought fit, allow a sum to meet the cost of re-investment (if any). Under this clause, the arbitrator would have had all the powers he would have possessed under the original clause; the variations being in the words, not the substance. One further difference was that, in the latter clause, they were varying the tribunal by asking the House of Commons to be the deciding body. In July, 1895, Parliament was dissolved; and in the session of 1896 the Bills were rejected. A change took place also in the constitution of the County Council; and a difference of opinion as to policy manifested itself. The Parliamentary Committee of the Council, which consisted of the members of Parliament on the Council, had not the majority of Liberals it had before; and it was decided not to proceed with the Bills. Then, on Dec. 6, 1895, the Parliamentary Committee recommended that the Government be invited to constitute, by Act of Parliament, a public authority for the whole area of the Companies, which should be invested with the existing powers of control. In regard to the Lands Clauses Act, he pointed out that it contained no provision directing an arbitrator to allow 10 per cent. or any other sum; yet by the practice of many years it had become the custom to allow, in arbitrations under this Act, a certain sum for "compulsory purchase."

The CHAIRMAN: The Courts have decided, too, that in an arbitration under the Land Clauses Act the arbitrator is bound to ascertain the value to the vendor of the thing taken?

Witness: Yes.

Mr. CRIPPS: It is the same in every arbitration. (To witness:) Suppose the arbitrator had an instruction to give fair value without reference to supposed value or supposed duties under any Act of Parliament, that would get over it?

Witness: Yes.

Mr. CRIPPS said it seemed to him that, suppose both sides were agreed on purchase, they were not far apart on terms.

Witness: I think we have been willing all along to put our contentions at the mercy of an arbitrator of standing. Continuing, he said the County Council had throughout accepted the decisions of Lord Balfour's Commission, as far as they went; but they held that these decisions and recommendations did not afford a final or satisfactory settlement of the question. The amount of water that would be available if the recommendations were adopted would not be sufficient for London ultimately; and the method proposed was the most expensive. For these reasons, the Council did not regard the report as final or satisfactory. The main suggestion of Lord Balfour's Commission was to obtain more water from the Thames and Lea, and store it in a large system of reservoirs; and with this the Water Committee of the County Council disagreed. The scheme of obtaining water from Wales would be much cheaper.

The CHAIRMAN: If the Council purchased the Companies, they would stop the Staines Reservoirs scheme and go to Wales for a new supply?

Witness: I am sure past Councils would have done so.

Major-General SCOTT: By stopping the Staines Reservoirs scheme, I presume your Lordship means completing one instalment?

The CHAIRMAN: Yes. (To witness:) Would you take no more water from the Thames, and provide no more reservoirs?

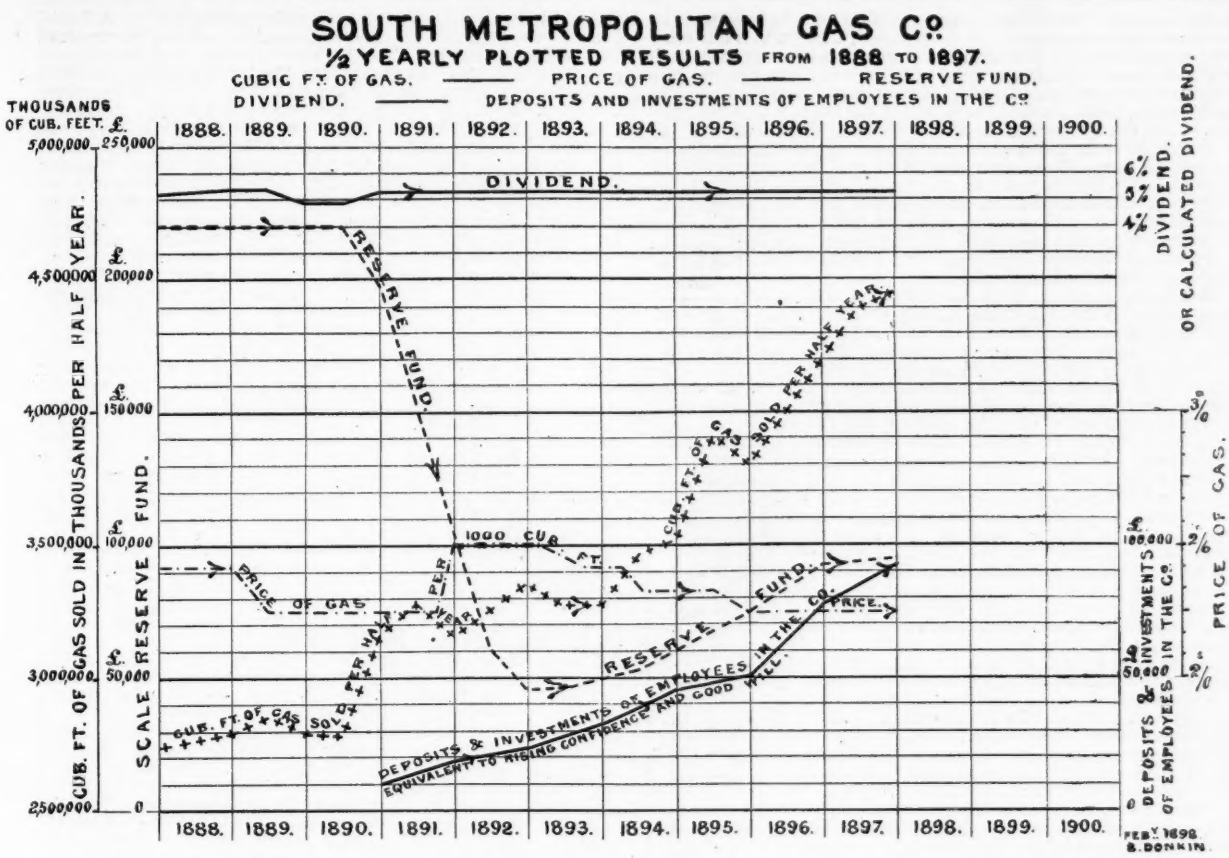
Witness replied that it was difficult to speak for both sides of the Council; but he believed that Lord Onslow even was in favour of an additional source. Witness went on to refer in great detail to reports by the Water Committee of February and April, 1896, in which the water question was exhaustively treated, and in which the Council were recommended to go for a further supply to the valleys of the Usk, Wye, and Towy, whence a supply of 415 million gallons a day—sufficient for all the needs of London, and of unquestioned quality—could be obtained.

The CHAIRMAN: As I read it, you are there recommending that the Council should apply to Parliament for powers to carry out portions of the Welsh scheme independently of purchase—not coupled with any scheme of purchasing the Water Companies, but seeking a supply in Wales and leaving the Companies severely alone?

Witness: Not necessarily so. This was going on concurrently, with the hope that we should get through our Purchase Bills. Having referred to the reports of Sir Benjamin Baker and Mr. G. F. Deacon, that the additional supply of water for the Metropolis should come from Wales, witness pointed out that they now had to comtemplate the possibility of the Welsh supply being substituted for that at present existing, which was a very important question in connection with the subject of purchase. The tendency now was to abandon the river supplies in future. Of course, if large expenditure were incurred in purifying the water, those supplies might continue; but if (say) cholera arose, they would have to be left at once. The Council had approved of the Welsh scheme, but had not decided to take steps in Parliament to promote it.

Witness's examination had not concluded when the Commission adjourned.

The fourteenth sitting of the Commission was held yesterday at the Westminster Town Hall—Lord Llandaff presiding. Mr. W. H. Dickinson, further examined by the Chairman, continued his statement of the proceedings taken by the County Council in Parliament and elsewhere with respect to the Metropolitan Water Question.


SOUTH METROPOLITAN GAS Co.
½ YEARLY PLOTTED RESULTS FROM 1888 TO 1897.
CUBIC FT. OF GAS. —— PRICE OF GAS. —— RESERVE FUND.
DIVIDEND. —— DEPOSITS AND INVESTMENTS OF EMPLOYEES IN THE Co.
THOUSANDS OF CUB. FEET.
CUB. FT. OF GAS SOLD IN THOUSANDS PER HALF YEAR.
SCALE RESERVE FUND.
DIVIDEND OR CALCULATED DIVIDEND.
PRICE OF GAS.
DEPOSITS & INVESTMENTS OF EMPLOYEES IN THE Co.
1888. 1889. 1890. 1891. 1892. 1893. 1894. 1895. 1896. 1897. 1898. 1899. 1900.
DIVIDEND.
RESERVE FUND.
PRICE OF GAS.
1000 CUB. FT. PER HALF YEAR.
CUB. FT. OF GAS SOLD PER HALF YEAR.
RESERVE FUND.
PRICE.
DEPOSITS & INVESTMENTS OF EMPLOYEES IN THE Co. AND GOOD WILL.
CUB. FT. OF GAS SOLD PER HALF YEAR.
EQUIVALENT TO RISING CONFIDENCE
FEBY 1898 B. DONKIN

THE PAST TEN YEARS' WORKING OF THE SOUTH METROPOLITAN GAS COMPANY.

Readers of the "JOURNAL" may remember that, in the report of the proceedings at the recent meeting of the South Metropolitan Gas Company (*ante*, p. 411), reference was made to a diagram prepared by Mr. Bryan Donkin, and exhibited by him, showing graphically the results of the Directors' policy during the past ten years. It was impracticable to reproduce, even on a reduced scale, the coloured diagram submitted to the proprietors; but Mr. Donkin has since had it re-drawn in a more suitable style for our pages, and has courteously placed it at our disposal. It is given above; and it may be left to tell its own story without comment.

NOTES FROM SCOTLAND.

From Our Own Correspondent.

Saturday.

The Edinburgh and Leith Gas Commissioners have, temporarily I hope, lost their character for the businesslike way in which they despatch their affairs, which they have held for a number of years. The cause of this is the advent of some members who are prone to talk at large, if not to the gallery. There was a further reason, most probably, why the meeting which was held this week was marred by so much talk, and that is that the Commissioners were without the steadying influence of Sir Andrew M'Donald, Lord Provost Mitchell Thomson, and Bailie Kinloch Anderson, all of whom are abroad at the present time. One of the first subjects to be taken up was a recommendation by the Finance Committee regarding the pay and hours of the officials and clerical staff. Besides individual recommendations regarding salaries, which are too numerous to mention, there was a general recommendation that the office hours should be from 9.30 to 5, with an interval of half an hour for luncheon. That is a working day of seven hours; yet a Socialist member of the Commission, by a curious miscalculation, considered it to be eight hours, and expressed his distress at the thought that these gentlemen should get an eight-hour day while the poor men in the works should have to work nine or ten hours. Strange to say, the error was not corrected; and the incident was closed by the remark that, when they came to deal with the hours of the workmen, it would be seen what they would do. The Finance Committee did not make any recommendation regarding the salary of Mr. J. S. Gibb, the Treasurer to the Commission; but the proposal was made in the Commission that, seeing the increase in the business of the Commission, and also considering the scheme of re-arrangement which is to come into force now, he should receive an advance of £50 a year. Even this proposal, reasonable though it was, was cavilled at; but I am glad to say that it was eventually carried. The scheme of re-arrangement is that Mr. Gibb assumes the supervision of the collectors' and the consumers' clerks' departments; and the Engineer is to have supervision of the surveyor's department. The statutory collector is to have power to ask for, and obtain, at any time he may desire to do so, any information he may wish from the consumers' clerks. Hitherto there has been occasional friction between some of the departments; but these arrangements, whether or not they be to the taste of those interested, should make matters work smoothly. There was a long discussion over a proposal to increase the price of gas for public lamps from 2s. 1½d. to 2s. 5d. per 1000 cubic feet. There was some difficulty about the date when the change was to take effect; and there appeared to have been cross-purposes between the Commission and the Cleaning and Lighting Committee of the Corporation on the subject. The resolution come to was to enforce the increased charge as from Jan. 26, instead of Sept. 26 last. The annual dinner of the Commissioners was fixed for the 16th inst. Upon this subject many stupid, and some nasty, remarks were made, which it would do no good to anybody to reproduce. Such is the tenderness of some members, however, over the expenditure of the money of the Commission upon the dinner, that it was actually moved and seconded that each member should pay for his own ticket. Provost Bennet, of Leith, who presided, ruled the motion out of order. The mover and seconder of this resolution then walked into the refreshment-room, where it is to be supposed they helped themselves to the good things which were laid out there. The introduction of such trifling subjects at public boards reduces administration to an absurdity. There is sufficient genuine work to do to take up the time of the members; and those who revel in such subjects as were made so much of here, must either have little aptitude for business, or have forgotten the fact that nothing in this world is perfect, and that there is not an Act of Parliament which is not contravened regularly with impunity; or, as I once heard a learned Judge say, there is not a person living within the three kingdoms who does not every day do something which is in contravention of some Act of Parliament or other.

The only piece of business of general interest which was transacted was in connection with the report of Mr. W. R. Herring, the Engineer. This showed that in Edinburgh and Leith, during January, there was a decreased output of gas to the extent of 8,355,000 cubic feet; but in Portobello there was an increase of 1,287,000 cubic feet. Since May 16 there had been a total increase of the output from all the three works of 23,536,600 cubic feet. Regarding this, Mr. John Jamieson pointed out that the decreases in Edinburgh and Leith were due to the exceptionally mild weather, and that the increase in Portobello was accounted for by the fact that the Commissioners had reduced the price of gas from 4s. to 3s. per 1000 cubic feet. These explanations were quite reasonable; and the test of them will be found in the experience of other places.

It does not follow that because a public official may successfully carry on his work, that he will be universally appreciated. This is the experience of Mr. W. Ewing, the Manager of the Hamilton Gas-Works. Mr. Ewing has been more than ordinarily successful; but in the securing of the economies he has effected he has necessarily encroached on the position and pay of the working men. This led one of their champions in the Town Council—a Mr. Meechan—to raise the question of the hours, wages, and labour of the workmen. Speaking on the subject at a meeting of the Council on Thursday, Bailie M'Hale said that, with reference to Mr. Meechan's question as to whether it was the fact that more gas was being produced at the works with a smaller number of men than formerly, he had made inquiries, through their Manager, at various gas-works; and he was proud to say their workmen were better treated as to wages, hours, sick pay, and holidays than those in any gas-works of corresponding size in Scotland. Eleven questions were submitted to the managers of the various works in nine towns similar in size to Hamilton; and the answers showed that their town bore favourable comparison. In only one instance were the men treated more liberally than in Hamilton. He was prepared to leave an analysis of the replies in the Town Clerk's office, for any members of the Council who might be interested

in the question. Provost Keith, who erstwhile used to indulge in an occasional gird at the gas-works management, thought that this was a most satisfactory state of affairs; but a man who does not want to be convinced can usually interpret facts in a different way from that in which they strike most people, and Mr. Meechan expressed dissatisfaction. The men, he said, had to charge 2½ more retorts now than they did two years ago. Now, too, the men, when their bodies were heated, had to go out in the middle of the night, whether it was snowing or raining, and put coke on the bing. Formerly this was done by a man kept to do that class of work; and he failed to see where they were obtaining any advantage. There is no desire on the part of the Corporation to deal harshly with their workmen; and so Bailie M'Hale undertook to have the latter statement inquired into. He had better be cautious, because, if he removes all the workmen's grievances, where would labour candidates get a cry at the next election?

Last Thursday night, the Town Council of Stirling adjusted their petition against the Bill of the Stirling Gas Company. It is a long document, containing 38 clauses, and in the opinion of some is unnecessarily overloaded. In clause 20, for instance, it is narrated that in connection with the Bill of last year the method adopted for ascertaining the value of the gas undertaking was contrary to the interests of the community of Stirling. There need be no hesitation in characterizing this as contrary to fact; for the valuation was twice made, and there were only a few hundred pounds difference between them. One was a private and the other a public valuation; and if the community of Stirling had accepted the first, they would have been the owners of the works by this time, and have saved all the outlay which they had last year and will incur this year. But the party who are promoting the opposition, and who dub themselves "the ratepayers' friends," are not strong in the region of economy. To give one instance, I see it pointed out that more than a fortnight ago the Gas Company offered to hold a conference with the Town Council on the subject of the Bill; but no reciprocal step was taken, and it is now out of the question that a conference can take place, on account of the ultra-antagonistic attitude taken up by the Town Council. A conference might have led to the arrangement of some of the points of difference—such as, for instance, the price and quality of the gas. It is made a point by the opposition that the initial price should be 4s. per 1000 cubic feet, and the illuminating power 20 candles. The petitioners ask a price of 3s. 4d., which, I think, is the present rate, and an illuminating power of 25 candles. A conference would have demonstrated that it is absurd to propose the initial price at the same figure as that at which gas is at present being sold; and that as regards the illuminating power, when a company is being made a statutory one, with penalties leviable, it is necessary to have some margin. But the most suggestive clause in the petition is the 31st. In it the petitioners submit that they should be entitled to acquire the undertaking of the Company, if they think fit, in their existing condition, and that the Company should not, at least for some definitely prescribed period, be authorized to do more than maintain their works; and that the petitioners should, in view of the proceedings in the last session of Parliament, be allowed a sufficient time to consider the question of purchase. There is no excess of fair play manifested here. The Company are to be restrained for "a definitely prescribed period;" but the Corporation are to get "a sufficient time." How long the "sufficient time" might be I suppose the Corporation do not themselves know; but it does not matter much, because Parliamentary Committees do not place companies upon whom they confer statutory powers upon tenterhooks, awaiting the decision of any inchoate body who may say they have designs upon the concern which they are not yet prepared to disclose. Judging by precedent, I suppose that a Committee would give 24 hours to the Corporation to incubate. But the remarkable thing is that the Corporation should suggest that there lurks anywhere in their imaginations a desire to acquire the works. It must be assumed that they have a serious intention to purchase, because there is no burden upon them of giving notice beforehand for the purpose of complying with the forms of the House. This could have been done at the last moment; and therefore the notice is given for another purpose, which can only be the strengthening of their position before the Committee. Taking it, then, as serious, it shows either a conversion since last year, or that last year's position of the party who then opposed the transfer, and who now oppose the Bill, was insincere. If it be a matter of conversion, they give away their whole tactics of last year; and a new ground of attack would be necessary. This is what they have not found—or at least do not make manifest; for their petition puts forward the old arguments. If the point of view of insincerity be reached, that insincerity may have been last year or it might be this year—it really does not matter which; and, in any event, the opposition would find that they had a good deal to explain. Whichever way the whole subject is looked at, the Corporation have a stiff battle to fight. The Company will very likely lead the evidence which they submitted in the reference last year; the Corporation, unless transfer be their card, cannot put it forward. If it be transfer, then the Parliamentary Committee will find the question of valuation settled for them; if it be not, then a new set of witnesses will be required. There is another alternative, which is that the Corporation are bungling their case; and this is not improbable, seeing the inconsiderate way in which the party now in power have developed their scheme. With this thought in view, I suppose that nothing can be deduced from the fact that the Corporation are taking in new witnesses. At this week's meeting of the Edinburgh and Leith Gas Commissioners, permission was given to Mr. Herring, at the request of the Corporation of Stirling, to appear and give evidence on their behalf. The Company, on their part, are busy preparing for the fight in Parliament. This week I saw their Secretary in consultation with an eminent Q.C. upon the subject. As, however, he may not after all be retained, I refrain from giving his name. He was not, I may say, in the parliamentary proceedings last year.

A gas-works scandal is being worked up in Perth. It appears that several months ago Bailie Wright, the Convener of the Works Committee of the Perth Gas Commission, became proprietor of the gas-works at Bankfoot—a very small place two or three miles out of Perth. Thereafter he began to purchase coal and other materials from the Commissioners; thus, I have no doubt, getting the goods much cheaper than he would have done if he had gone into the market to purchase the small quantities he required. About £86 worth of goods were transferred to him, when the Treasurer to the Gas Commission objected to the practice; and Bailie Wright at once put a stop to it, and settled up the account. A Special Committee was appointed to consider the matter; and they have reported that an irregularity took place, but that there was no bad faith on the part of Bailie Wright. This report is to come before the Gas Commission at their first meeting, when, it is expected, there is likely to be a sharp discussion. Now, even granting there was an irregularity, it was only a technical one, and was not worth all the fuss which is being made about it. I am sure that a word to Bailie Wright would have had the same effect as the dragging of the matter into public notice. The same Committee have also been considering the subject of the discovery that Mr. A. Wilson, the Engineer to the Commission, has given advice to the proprietors of one or two gas-works in the neighbourhood. Mr. Wilson has expressed regret for what he had done; and there probably the matter will rest—at least it should. But there is another matter, relating to the new gas-works for the Commission, in which Mr. Wilson is being troubled. This came out at a special meeting of the Gas Commission on Monday, which was called to consider the estimates for the new works. These had been sent back to a Sub-Committee to be reduced. The report of this Sub-Committee was that they were not satisfied that the works could be carried out to the satisfaction of the Commissioners at a reasonable figure. They therefore recommended that an expert gas engineer should be invited to report regarding plans suitable for Perth, at a cost not exceeding the sum available according to the borrowing powers under the recent Gas Act. The meeting further instructed the Clerk to write to West's Gas Improvement Company, Limited, explaining the difficulties that had arisen through the Manager having greatly exceeded the estimated probable cost of the new works, and asking them to say how far they were prepared to meet the Commissioners in getting over the difficulties. At the meeting of the Commission, Councillor Brand moved the adoption of this recommendation. He said that before they went to Parliament for power under the last Act they had the assurance of their Manager that £50,000 was ample for the new works. When they had taken in the contracts, however, they found that this sum was exceeded by something like £20,000, which brought them face to face with a very serious difficulty. They had no alternative but to ask the Commissioners to appoint an independent man to give the best advice and best skill that they could obtain. If it was found that they could not erect works suitable for Perth at £50,000, then the alternative was that they should go to Parliament for a Provisional Order to borrow what extra money was required. Councillor Dempster seconded the motion. Ex-Bailie Gow moved that the Commission should delay until they had received a reply from West's Company. Councillor Campbell seconded, seeing that the Commission were to an extent in the Company's hands. They had committed themselves to a certain amount of contract work; and it would be prudent, therefore, for them to defer the matter until they received the reply. Bailie Wright, in answer to a question put by Councillor Keiller, said that, regarding the £70,000, it included £9000 for a gasholder and governor-house, £5500 for the levelling of ground and the building of a retaining wall, £2000 for a railway siding, £2000 for piping from the works to the holder, £2000 for scrubber, condenser, and sulphate plant, £2500 of parliamentary expenses, £1000 for a new road at the Shore, and £1500 for the new bridge. There was not much, therefore, left over for them to spend. Ex-Dean of Guild Wotherspoon expressed the opinion that £50,000 was more than sufficient for the purpose; and he was not therefore prepared to go to Parliament for further powers. Lord Provost Dewar, summing up the discussion, said that, going back to the time of Mr. Whimster, they found that there was a proposal to put up gas-works at £25,000. This sum included the cost of a new site and some material, and also the building of a gasholder. They got up from that estimate to £35,000 when Mr. Wilson came, and ultimately to £50,000; and this apparently was not sufficient, and the plans Mr. Wilson had prepared were to take £70,000. They were, however, agreed that the plans were entirely unsuitable, and did not recommend themselves to the Commission. They must be guided by experts, and get the best advice as soon as they could. After all, it might turn out that the works could be built for less. Personally, he was of opinion that they could be built for the sum Mr. Wilson originally estimated. He could not, however, for the life of him, see what connection West's reply had with the appointment of an engineer. They wished to have his advice as to the proposal; and the sooner, therefore, they had an engineer the better. On a vote being taken, Councillor Brand's motion was carried by 14 votes to 8. Now, £20,000 is rather a large excess in the estimates; but then we must not forget that we have not yet heard Mr. Wilson's side of the question.

In Dundee, the proposal to extend the gas-works does not proceed rapidly. The Town Council are difficult to move in the matter. An ingenious attempt to prod them on was made in the "Dundee Advertiser" this week, in a description of the Glasgow Gas-Works, written by a special correspondent, and published with illustrations of the drawing and charging machines. The writer gives a very intelligent description of the works, as well as tables of the costs of the old as compared with the new methods of working. The calculation is that, at 1s. 3d. per ton, a saving to the amount of £25,000 a year is effected by machinery in Glasgow. The sequel to that—and here lies the gist, and probably the reason, of the article—is, how much would be saved in Dundee if they were to follow the example of Glasgow; and the reply of Mr. Foulis was: "I should say £3000 per annum." Such an opinion, from one who has experience of what he was speaking about, should help on the work. Mr. Foulis, it will be remembered, is Consulting Engineer to the Corporation of Dundee; and hence the appropriateness of the article. The Gas Committee of the Corporation of Dundee this week resolved to recommend the Council to set aside the proposal to introduce carburetted water-gas plant in the meantime; and to instruct their Manager, after consultation with Mr. Foulis, to bring up plans and estimates for extensions on the works for the purpose of producing an additional supply of coal gas.

The Typhoid Fever Epidemic at Maidstone.—A number of the sufferers in the recent typhoid fever epidemic at Maidstone have decided to bring a combined action against the Water Company to obtain compensation for the losses they have suffered. The Company had expressed their willingness to make a grant of £3000 as compensation, on conditions which the consumers would not accept.

CURRENT SALES OF GAS PRODUCTS.

LIVERPOOL, *March 5.*

Sulphate of Ammonia.—The tendency of the market is still in the downward direction; and a further decline in values has to be recorded—the closing quotation being £9 12s. 6d. per ton, delivered f.o.b. at the ports. A fair amount of business has been done; but buyers have only been covering their immediate requirements—postponing further purchasing for the chance of doing better later. Meantime, available supplies are becoming more abundant, though the large makers are still engaged in delivering on contracts. Speculators are venturing to offer ahead at a discount on spot prices; but buyers remain indifferent. Makers generally maintain a firm attitude, though London is being offered at £9 15s. per ton, Beckton terms, April-June delivery.

Nitrate of Soda still drags, notwithstanding large deliveries; and spot price remains at 7s. 6d. per cwt. for fine quality.

LONDON, *March 5.*

Tar Products.—Benzols continue dull, with a lagging market at 1s. 4d. f.o.b. London, and 1s. 3d. f.o.b. provincial ports. A slightly better tone prevails in pitch; and makers are busy shipping, as the season for this is rapidly closing. There is a firm market in creosote—this article still being scarce; and a somewhat better outlook in naphthalene in its various positions. Solvent naphtha is asked for; and the price is curiously maintained, though it is much above benzol. A slightly improved outlook exists for carbolic acid, as well as for cresylic; the production of the latter article being under demand. Anthracene is notably firmer, though no important business is reported. It looks as if this much neglected article is likely to see better times. Undoubtedly, the production has fallen off to an extraordinary extent—first, from the low prices; and, next, from the lessened production of tar, which is very marked this season. The mildness of the weather, and the present enormous production of carburetted water gas which produces no tar are the chief causes of this.

Prices may be taken as follows: Tar, 12s. to 16s. Pitch, east coast, 18s. 6d. to 19s. 6d.; west coast, 15s. 6d. to 16s. 6d. Benzols, 90's, 1s. 3½d.; 50's, 1s. 6d. Toluol, 2s. Solvent naphtha, 1s. 6½d. Heavy naphtha, 1s. 3d.; crude, 30 per cent., naphtha, 7d. Creosote, 2d.; liquid, 2¼d. Heavy oils, 35s. to 42s. 6d. Carbolic acid, 60's, 2s. Pressed naphthalene, 50s.; salts, 27s. 6d. Anthracene, "A," 5½d.; "B," 4½d.

Sulphate of Ammonia is dull; and though makers are, chiefly speaking, not offering (being heavily sold), dealers are apparently determined to depress prices. The large production is rapidly falling off; and makers were never so little stocked as they are to-day, so there is no reason for a less price than is now mentioned. The undoubted advantages shown by sulphate of ammonia during the past two or three seasons are causing it to be used in a much larger area than formerly. The nominal quotations for to-day are £9 12s. 6d. to £9 15s., less 3½ per cent., at all ports.

COAL TRADE REPORTS.

From Our Own Correspondents.

Lancashire Coal Trade.—In the better qualities of round coal, business continues to move on steadily with the colder weather. Pits are mostly on full time, and clearing away their output; but there is still little or nothing being taken out of stock, and prices are not more than maintained at late rates. From 10s. to 10s. 6d. per ton at the pit are the full average figures for best Wigan Arley; 8s. 6d. to 9s., for Pemberton four-feet and seconds Arley; and 7s. for common house coal. The lower qualities of round coal continue plentiful upon the market; and, with excessive supplies, they are offering at low figures for steam and forge purposes—6s. to 6s. 6d. per ton at the pit remaining about the average. Engine classes of fuel move off fairly well. But there is no scarcity except in some special sorts; and prices are without quotable change. For shipment only a moderate business is reported, and common sorts of steam coal are offering freely; being obtainable at about 7s. 6d. to 7s. 9d. per ton at the pit mouth, with better qualities quoted at 8s. 3d. to 8s. 6d.

Northern Coal Trade.—There has been greater dulness in some branches of the coal trade in the past few days, though the colder weather has augmented the consumption both of gas and household coals. Steam coals have been very abundant; and as there has been a rather limited shipment, the prices have been weaker. Best Northumbrian steam coals have fallen to about 7s. 10½d. per ton f.o.b.; second qualities being 7s. 7½d.; and steam small coals, about 3s. Manufacturing coal has now regained its normal position; the factories working regularly, and taking full supplies. In the gas coal trade, there has been a larger consumption; but the companies had large stocks of coal, and thus the demand has not been much fuller at the gas-coal pits. The price quoted is now about 7s. 6d. to 7s. 9d. per ton f.o.b. for best Durham gas coal. There is no alteration in gas coke prices; but the steady working of some of the cement factories has enlarged the demand, and lessened stocks.

Scotch Coal Trade.—It is quite in accordance with custom that there should be dulness in the coal trade at this season; but, in addition, the mild weather of the winter has allowed stocks to accumulate. The tone of the market, however, is hopeful. That is all that can be said. The prices quoted are: Main, 6s. 6d. per ton f.o.b. Glasgow; ell, 7s. to 7s. 3d.; and splint, 7s. 3d. to 7s. 6d. The shipments for the week amounted to 138,813 tons—an increase of 20,557 tons over the previous week, and of 27,207 tons over the corresponding week of last year. For the year to date, the total shipments have been 1,012,699 tons—being an increase of 16,078 tons over the corresponding period of last year.

Reductions in Price.—The Newcastle-under-Lyme Town Council have decided to reduce the price of gas to 2s. 10d. per 1000 cubic feet, with a discount of 5 per cent. for payment of accounts within a month. The charge at East Grinstead is to be reduced from 4s. 4d. to 4s. per 1000 cubic feet as from April 1. The Directors of the Warrenpoint Gas Company recommend a reduction of 5d. as from Jan. 1 last.

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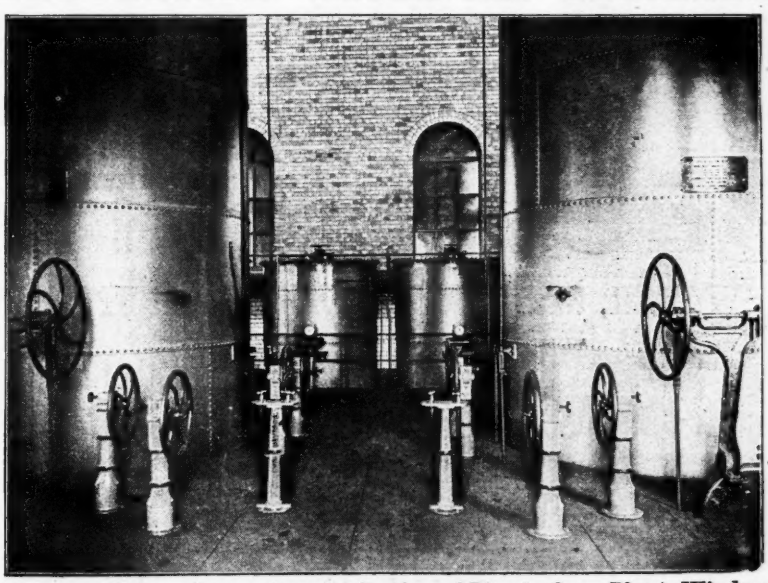

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The Maximum Daily Capacity of the Birmingham Corporation's Plant, which was erected by this Company, is 10 MILLION CUBIC FEET.

Proposed Purchase of the Clacton Gas and Water Undertaking by the Local Authority.—At the meeting of the Clacton Urban District Council last Wednesday, the Water Committee reported the result of a conference they had had with the Directors of the Clacton Gas and Water Company, with reference to the Bill promoted by the latter. The Council had resolved to purchase the Company's undertakings on terms to be agreed upon or settled by arbitration; and it was arranged to allow £4000 in respect of any claims to compensation on account of disturbance of officers, or in respect of past dividends. The Company's Solicitors are to submit a draft agreement giving effect to the arrangement that has been come to.

Sales of Shares.—Messrs. Hooker and Webb recently disposed of £2500 of the Croydon Commercial Gas and Coke Company's 5 per cent. perpetual debenture stock in 25 lots of £100 each. The whole realized £4000, or at the rate of £160 per £100. A parcel of £5000 of consolidated "B" stock, being a portion of the additional capital which it was agreed to raise at a meeting of the Company some time ago, on which the present dividend is 11 per cent., was disposed of at prices ranging from £267 to £271 10s. per £100; the total amount raised for this stock being £13,511. A few £1 shares in the Truro Gas Company were sold by auction yesterday week at from 28s. to 30s. each; the latter being the highest price reached for these shares.

The Price of Gas at Newport (Mon.).—The Lighting Committee of the Newport Corporation recently asked the Gas Company to make a reduction in the price of gas to all consumers. The Directors returned an unfavourable answer to the request; and in their reply they stated that there are 430 gas companies in the kingdom, 345 of which charge a higher rate than that paid at Newport, while of the 208 local authorities who own gas-works 136 also charge a higher price. The Corporation Committee are not satisfied with this result, and again suggest a reduction, or that at least the Directors shall consent to discuss the matter at a conference between the two bodies. Otherwise it is proposed to make application to Quarter Sessions to order an investigation of the Company's accounts, with a view to securing a reduction in price.

The Drogheda Corporation and the Gas-Works.—As notified in the "JOURNAL" last week, the Drogheda Corporation have decided to purchase the undertaking of the Gas Company for £21,000. The works and plant are to be taken over as from Dec. 31 last; but the Company will carry on the concern until the purchase-money is paid, without participating in any profits beyond the usual dividends. The above-named figure does not include the reserve fund, the stock of coal and cannel, the cash in hand, or the book debts. The stock is to be taken at a valuation, to be made out on the date of the transfer. The Corporation wished to get everything for the £21,000, so that they might take possession of the whole as a going concern. This was the subject of a long discussion; but it was eventually decided to settle the agreement as above rather than spend money over the matter. A petition praying for the insertion in the Company's Bill of clauses sanctioning the arrangement come to has been presented to the House of Commons by the Corporation.

Salaries in the Manchester Corporation Gas and Water Departments.—Last Wednesday, the Manchester City Council, after a little ineffectual opposition, made advances in the salaries of officials in several departments—the whole involving an additional annual expenditure of £775. The Gas and Water Departments together came in for rather more than two-thirds of the sum—the actual increases for gas officials amounting to about £218, and for water officials to £320. Among the gas officials who received additions were: Mr. J. Merrill, Manager of the Gaythorn works; Mr. A. Rhodes, Deputy-Manager; Mr. A. Massey, Chemist; Mr. J. R. Hill, Deputy-Manager of the Rochdale Road works; Mr. E. Williams, Senior Chemist; Mr. J. S. Naylor, Manager of the Droylsden works; and Mr. W. Rodger, Manager of the Bradford Road works. Among the water officials were: Mr. Daniel Charlton, the Financial Superintendent; Mr. William Blackstock, Secretary; Mr. J. Haynes, General Inspector and Surveyor of Mains; and Mr. L. Holme Lewis, Engineer and Manager of the hydraulic power supply.

Southampton Gas Company's Bill.—Last Tuesday, a meeting of the owners and ratepayers of Southampton was held for the purpose of consenting, or otherwise, to the opposition of the Corporation to the Gas Company's Bill. The Mayor (Alderman Tilling) presided; and, at his request, the Town Clerk explained the grounds on which it was considered advisable to formally petition against the Bill. The first point was that the Corporation thought it desirable that the newly-added districts—Shirley, Freemantle, Millbrook, and Bitterne Park—should be placed on an equality, as to the price of gas, with the ratepayers of the old borough who were charged at present 2s. 6d. per 1000 cubic feet of gas. Under their Act, the Company had power to charge 4s. 6d. in the old borough; while in the added areas it was 5s. Within the old borough, the charge was 2s. 6d.; while the consumers just outside had to pay 3s. The Corporation felt this injustice ought no longer to continue. The Company were seeking to very largely extend their area of supply. They were asking Parliament to give them power to supply gas to Lyndhurst, Chandler's Ford, Hamble, Hedge End, Bursledon, North Baddesley, and Rownhams, and might demand the same charge. Therefore, if the limits of supply were extended to the considerable extent asked for, the people of Shirley would have to pay precisely the same price as the consumers in the other places he had named. The Corporation considered this was not right, and that Parliament should be asked to fix the maximum price at 2s. 6d. per 1000 cubic feet throughout the area. Another point on which they thought they should have power to oppose was as to the illuminating power of the gas. By their present Act, the Company were only bound to supply gas of 14-candle power; and the Corporation were asking that the illuminating power should be raised to 16 candles. They also wished for additional facilities for testing the quality of the gas. There had been a meeting with the Directors of the Company; and they had yielded the whole of the points, except that as to the maximum charge. They were considering this, and were going to let the Corporation have a reply very shortly. The Corporation had made it one of the conditions of settlement that the Company should pay their costs; and, no doubt, the Company with the large funds at their disposal would see the justice of this. A resolution was passed consenting to the opposition of the Corporation.

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Under the auspices of the Gas Committee of the Southport Corporation, an exhibition of gas appliances, combined with free cookery lectures by Miss Rose Brown, was opened at the Coronation Hall last Tuesday. It was arranged by the Cannon Hollow-Ware Company, Limited, and was under the management of Mr. J. Booth, the Corporation Gas Engineer, assisted by the members of the Southport Ironmongers' Association. It comprised a full assortment of the Company's "Hercules" gas cookers, as well as a large collection of gas fires, boilers, irons, grillers, &c. The lectures were continued twice daily until Friday; and altogether the exhibition was a pronounced success.

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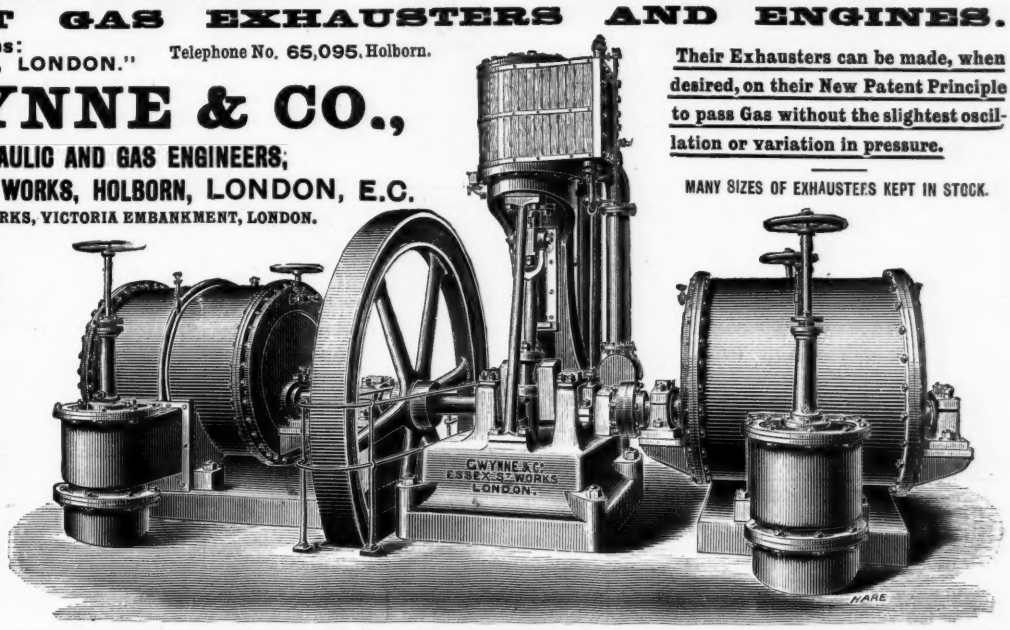

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Orders for Alterations in, or Stoppages of PERMANENT ADVERTISEMENTS, should be received not later than the FIRST POST on SATURDAY.

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[For Illustrated Advertisement, see March 1, p. 506.]

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SULPHURIC ACID for Sale.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

GAS CARBON Wanted, not less than 4-Ton Loads.
Apply to the BRIMINGTON CARBON COMPANY, Sowerby Bridge, YORKS.

TO GAS AND WATER OFFICIALS.

SPECIALLY favourable terms for Cycles. First-Class Workmanship and Material guaranteed. Art Catalogue post free.
MELROSE CYCLE COMPANY, COVENTRY.

SPENT OXIDE wanted.
BROTHERTON AND CO., Chemical Manufacturers.
Works: BIRMINGHAM, LEEDS, and WAKEFIELD.

SULPHATE OF AMMONIA SATURATORS.

JOSEPH TAYLOR & CO., Chemical Plumbers, &c., and Makers of every description of Solid Plate Lead and Timber Cased Saturators, &c., CENTRAL PLUMBING WORKS, TOWN HALL SQUARE, BOLTON. Special attention to Repairs.
Before placing Orders, please write for Estimate.

ECONOMY IN PURIFICATION.

INCREASE the efficiency of your PURIFIERS by adopting CRIPPS'S PATENT BYE-PASS VALVE in the lower Tiers of Sieves. Practical Experience proves their Economy. Engineers are repeating orders after thorough trial.
References and Particulars can be obtained from the Makers—
C. & W. WALKER, Midland Iron-Works, Donnington, near Newport, SALOP.
And J. EVERY AND SON, Phœnix Iron-Works, LEWES.

TUBES for Gas, Steam, and Water (all Sizes) Welded or Riveted. TANKS, HYDRAULIC MAINS, RETORT-LIDS, &c.
JOHN SPENCER, Globe Tube Works, WEDNESBURY; and 14, Great St. Thomas Apostle, LONDON.

HUTCHINSON BROTHERS, Gas Engineers, &c., Falcon Works, Barnsley, Makers of Wet and Dry Gas-Meters, Brass-Work, and general Gas Apparatus, Lead Saturators, Tanks, &c., Tools, and Gas-Works Sundries. (See p. 508, last week's issue.)
Telegrams: "HUTCHINSON BROS., BARNSLEY."

PATENTS FOR INVENTIONS.

J. C. CHAPMAN, M.I.M.E., and Fel. Chartered Inst. Patent Agents. ADVICE ON ALL MATTERS CONNECTED WITH ABOVE. Information and Handbook on application.
70, CHANCERY LANE, LONDON, W.C.

SADLER & CO., Ld., Middlesbrough; ULVERSTON (BARROW); PORTSMOUTH; CARLTON (N.E.R.); and STOCKTON. Tar and Petroleum Distillers. Benzol and Petroleum Spirit, 700 and other Gravities specially prepared for Carburetting. SOLAR OIL for Gas Making, Kerosene, &c.
Correspondence invited.
Telegraphic Address: "SADLER, MIDDLESBROUGH."

GAS PLANT for Sale—I can always offer NEW and SECOND-HAND GAS APPARATUS, including Retorts and Fittings, Condensers, Exhausters, Scrubbers, Washers, Purifiers, Gasholders, Tanks, Valves, Connections, &c. Also a few COMPLETE WORKS. **Compare Prices and Particulars before ordering elsewhere.**
J. F. BLAKELEY, Gas Engineer, Ravensthorpe, YORKS.

IMPORTANT.

OLD Retorts made equal to new by repairing them with CROWTHER'S PATENT STICKFAST FIRE CEMENT. Unequalled for Repairing Inclines. Can be used in Hot or Cold Retorts; and "A1." for Mouthpiece Joints. Satisfaction Guaranteed.
CROWTHER, Practical Retort Setter, Manor Street, HUDDERSFIELD.

CANNEL, COAL, ETC.

JOHN ROMANS & SON, EDINBURGH, Gas Engineers, supply all the most approved SCOTTISH CANNELS; also FIRE-CLAY GOODS, CAST-IRON PIPES, and other APPARATUS for GAS and WATER WORKS.
Prices, &c., will be forwarded on application to No. 30, ST. ANDREW SQUARE, EDINBURGH, NEWTON GRANGE, NEWBATTLE, DALKEITH, } SCOTLAND.

Price 2s., Post Free.

STEPHEN CARPENTER, on the Purification of COAL GAS BY LIME, OXIDE OF IRON, AND ATMOSPHERIC AIR, and the Method of Working Purifiers so that the Lime may be used a second time, with a Description of Carpenter's short Method of Working off the Sulphur Test, and Table for Calculating Results.
S. CARPENTER, Ryde House, 28, Woodhouse Grove, East Ham, ESSEX.

ACETYLENE GAS LIGHTING.

A LARGE newly-established Company would like to enter into COMMERCIAL RELATIONS with trustworthy Manufacturers and Representatives of all Articles appertaining to Acetylene Lighting. Price Lists (illustrated preferred) and Patterns desired.
Offers to Mr. P. OUT, Bookseller, Koog a/d Zoon, HOLLAND. Motto "Acetyleen."

RE-ENGAGEMENT desired by competent METER-READER (three Years' experience), or as PREPAYMENT COLLECTOR, or similar position. Good References.
READER, 37, Stanley Grove, Stanley Road, WEST CROYDON.

WANTED, a smart, intelligent Young Man as METER READER and OUTDOOR INSPECTOR. None but competent Men need apply.
Apply, by letter, stating Age, Experience, and Salary required, to the MANAGER, Gas-Works, SEVENOAKS.

MAN wanted for a Village Gas-Works. Annual make, about 2½ millions. Not expected to light Public Lamps. Wages to commence, 22s. per week. Cottage, Garden, Coal, and Gas.
Address Mr. C. J. N. ROW, Long Melford, SUFFOLK.

WANTED, Two Gas Stokers used to Shovel Charging, Engine and Exhauster. Wages, 30s. and 35s. per week of Six and Seven days respectively. Permanency to active and steady Men.
Apply to the MANAGER, Gas-Works, Hart Street, Barking, ESSEX.

SMART young Man required to act as CLERK-IN-CHARGE and TIMEKEEPER during the erection of extensive Gas Apparatus, including Purifiers, &c. Must be able to set out the work.
Send full Particulars, including Age and Wages required, to No. 3014, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

WANTED, an Assistant Manager for a Gas-Works near London. Annual make about 70,000,000 cubic feet. Practical experience indispensable. A knowledge of Water-Gas Plant desirable.
Apply, stating Age, Salary required, with *copies* of Testimonials, to GAS COMPANY, 1, Cullum Street, LONDON, E.C. Applications to be made on or before March 14.

TO GAS AND WATER COMPANIES, ENGINEERS, &c.

"WOODITE"—Superior substitute for Rubber, Asbestos, Leather, for Steam and Gas Joints, Rings, Washers, &c.
Write to JAMES READ, 27, Derby Rd., Croydon, SURREY.

RHYL WATER-WORKS.

WANTED, a Night Inspector used to the working of the Deacon Waste-Water System. Must be a competent Man. Wages £1 per week, with Bonus.
Apply to LEONARD G. HALL, Assoc.M.Inst.C.E., Engineer.

GENERAL MANAGER AND ENGINEER REQUIRED.

THE Bombay Gas Company, Limited, will require the services of a thoroughly qualified Gentleman to proceed to Bombay about July next as GENERAL MANAGER and ENGINEER. Salary £1000 sterling per annum, inclusive of Rent and Horse allowance. Engagement Five Years.
Applications, by letter only, stating Age, if Married or Single, with Testimonials, to be addressed to the SECRETARY of the Company, 6, Drapers' Gardens, LONDON, E.C., and sent in not later than the 24th of March, 1898.

HINCKLEY URBAN DISTRICT COUNCIL.

THE above Council are prepared to receive applications for the post of ENGINEER and MANAGER to their Gas-Works.
Candidates must possess a thorough knowledge of Gas Manufacture and Distribution, also the Manufacture of Sulphate of Ammonia, and be prepared to devote the whole of their time to the Council's duties.
Salary not to exceed £250 per annum, with House, Coal, and Gas.
Applications, stating Age and Experience, &c., to be accompanied by *copies* of three recent Testimonials, to be sent in not later than Monday, the 21st day of March, 1898, addressed to the undersigned.
Canvassing any members of the Council is strictly prohibited, and will disqualify Candidates.
J. W. PRESTON,
Clerk to the Council.
Hinckley, March 5, 1898.

LARGE PURIFIERS WANTED.

WANTED, a second-hand set of Four PURIFIERS in good condition, with Connections complete. Superficial area of each box 500 to 580 square feet, with 18-inch Connections.
Price and full Particulars to No. 2999, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GASHOLDER and Iron Tank, 8500 cubic feet Capacity. Equal to new. Very Cheap.
Address No. 3011, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—Round Station Meter, 6-inch Connections, and 6000 Cubic feet per hour. Newly overhauled, and certified correct. A Bargain.
Address No. 3008, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

PIPE Condensers, eight heights of 6-inch Pipes and bottom Box. £12.
Address No. 3009, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

EIGHTY-LIGHT Dry Gas-Meter, by Alder and Mackay. Nearly new; £5 10s.
J. F. BLAKELEY, Ravensthorpe, YORKS.

GAS-PUMP for Sale, horizontal, one Steam Cylinder, 18-inch bore, and two Gas Cylinders, 17½-inch bore, all 24-inch Stroke, on massive Bed-Plate, with heavy Fly-Wheels. Very strong. First-Class Make. Not much used.
Apply, by letter, to No. 2878, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

GAS Exhauster, 20 to 25,000 cubic feet per hour, with Inlet and Outlet Valves and Connections. £30. By Donkin; splendid condition.
Address No. 3010, care of Mr. King, 11, Bolt Court, FLEET STREET, E.C.

FOR SALE—A Modern Sulphate of AMMONIA STILL, built by Messrs. R. & J. Dempster, Manchester, 1893, with separate Liming Compartment. Capacity, with ordinary Liquor, 6000 to 6000 lbs. of Sulphate per day.
For further Particulars, apply to the BRYMBO STEEL COMPANY, LIMITED, near WREXHAM.

WHITTINGTON GAS COMPANY, LIMITED, NEAR CHESTERFIELD.

FOR SALE—A Vertical Engine and ROTARY EXHAUSTER, separate from each other, with Bye-Pass Valve and sundry Connections. OVERHEAD SHAFTING and GEARING for two Vertical LIQUOR PUMPS, which are also for Sale. All in good order, and can be seen as fixed before removal. Suitable for a works making between 5 and 10 millions a year.
Apply as above.

FOR SALE—A valuable high-class CANNEL COLLIERY, yielding Cannel of about 30-Candle Power, with reserves equal to a duration (at the present output of 1000 Tons per week) of upwards of Fifty Years. The Colliery has paid Dividends exceeding £50,000 over the past Eight Years. It is fitted with most complete and efficient Plant, and is within favourable distance of important Shipping Ports. Principals only need apply.
Address FEATHERSTONE FENWICK, County Chambers, NEWCASTLE-ON-TYNE.

FOR SALE—Two Sets of Iron Mountings complete for Settings of Six 15-inch Circular Retorts. Separate Hydraulic Mains. One 8-inch FOUR-WAY VALVE, by Cockey. Twenty-one WALL BRACKETS, WALL PLATES, and BOLTS for 8-inch Cast-Iron Main.
Apply to H. WIMHURST, Gas-Works, SLEAFORD.

CAMBRIDGE UNIVERSITY AND TOWN GAS-LIGHT COMPANY.

THE above Company will shortly have FOR DISPOSAL two Sets of Three PURIFIERS 20 ft. by 10 ft. by 4 ft. deep inside, with two Centre Valves, 14-inch Connections, and Lifting Apparatus complete. All in good condition. The whole can be seen working at the Gas-Works, Cambridge.
By order,
R. BROWN,
Engineer and Manager.

FOR SALE, Cheap—The undermentioned GAS PLANT:—

	Square. Ft.	Deep. Ft.	in.		
2 PURIFIERS,	8	0	4	6	6-in. Valves & Connection
1 "	7	6	4	6	6 " " "
2 "	5	0	4	0	4 " " "
1 "	5	0	2	9	4 " " "

C.-I. SCRUBBER, 38ft. 6in. high, 6ft. dia., 14-in. "
CONDENSER, 4 inches diameter, Vertical Pipes.
EXHAUSTER (Gwynne's) 20,000 c.f. per hour 8-in. Valves
Apply to SAML. WHILE AND SONS, 60, QUEEN VICTORIA STREET, E.C.

ROTHERHAM CORPORATION GAS DEPARTMENT.

FOR SALE—The following second-hand Gas Plant in good condition. No reasonable offer refused.
1 18-inch CENTRE-VALVE, by Newton Chambers, and Co.
2 TOWER SCRUBBERS.
17 18-inch ROUND MOUTHPIECES.
1 20,000 per hour ROTARY EXHAUSTER.
3 18-inch RACK AND PINION VALVES.
7 12-inch RACK AND PINION VALVES.
Full Particulars, &c., from the undersigned.
FRANK A. WINSTANLEY,
Engineer.
Feb. 23, 1898.

CORPORATION OF ROTHERHAM.
(GAS DEPARTMENT.)

THE Gas Committee of the above Corporation are prepared to receive TENDER for the Painting of two Gasholders.
Particulars may be had on application to the undersigned, to whom Tenders, endorsed "Painting Gasholders," must be sent, on or before Monday, March 21, 1898.
FRANK A. WINSTANLEY,
Engineer.

CORPORATION OF ROTHERHAM.
(GAS DEPARTMENT.)

TESTING APPARATUS.

THE Gas Committee of the above Corporation are prepared to receive TENDERS for the supply and delivery of APPARATUS for the TESTING of COAL GAS.
Particulars may be had on application to the undersigned, to whom Tenders, endorsed "Testing Apparatus," must be sent, on or before Monday, March 21 1898.
FRANK A. WINSTANLEY,
Engineer.

CITY OF LEEDS.
(GAS DEPARTMENT.)

TENDERS FOR DRY GAS-METERS.

THE Gas Committee of the Leeds City Council are prepared to receive TENDERS for the supply of DRY GAS-METERS, to be delivered at their Meter Stores during a period of Twelve Months from receipt of order.
Each party tendering is required to send on or before Monday, the 14th inst., two sample Three-Light Meters (one of which is to be open for examination), addressed to the Gas-Meter Works, Meadow Lane, Leeds.
Forms of Tender may be obtained on application to the undersigned, at the Offices of the Gas Department, Municipal Buildings, Leeds.
Endorsed Tenders, addressed to the Chairman of the Gas Committee, at the latter address, will be received not later than Wednesday, the 16th inst.
The Committee do not bind themselves to accept the lowest or any Tender.
R. H. TOWNSLEY,
General Manager.
Municipal Buildings, Leeds,
March 4, 1898.

THE Gas Committee of the Leeds Corporation invite OFFERS for two pairs of ANDERSON'S EXHAUSTERS, consisting of four vertical Pumps, with Cylinders 26 inches diameter, each pair worked by a 10-horse power Engine, and capable of passing 50,000 feet per Cylinder per hour.
The Exhausters, which are in good working order, can be seen, and further Particulars obtained, on application to the undersigned.
Tenders, suitably endorsed, and addressed to the Chairman of the Gas Committee, Municipal Buildings, Calverley Street, Leeds, will be received not later than Monday, the 14th inst.
R. H. TOWNSLEY,
General Manager.
Municipal Buildings, Leeds,
March 3 1898.

FELIXSTOWE GASLIGHT COMPANY, LIMITED.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 1000 Tons of GAS COAL, to be delivered either at the Felixstowe Railway Station or the Felixstowe Dock during a period of Twelve Months as the Company desires.

Tenders, specifying description of Coal, to be addressed to the Chairman of the Company, and endorsed "Tender for Coal," not later than March 25.

The Directors do not bind themselves to accept the lowest or any Tender.

F. B. JENNINGS,
Secretary.

Felixstowe, March 5, 1898.

URBAN DISTRICT COUNCIL OF OLDBURY.

(GAS DEPARTMENT.)

THE Gas Committee of this Council are open to receive TENDERS for the supplying and fixing of One PURIFIER at their Gas-Works, Dudley Road, Oldbury.

Plans may be seen, and Specification obtained, on application in writing to the undersigned.

Sealed Tenders, endorsed "Tender for Purifier," and addressed to the Chairman of the Gas Committee, must be sent to me not later than Saturday, the 19th of March, 1898.

The Gas Committee do not bind themselves to accept the lowest or any Tender.

By order,
A. COOKE,
General Manager.

Gas-Works, Oldbury,
March 4, 1898.

MORECAMBE GAS AND LIGHT COMPANY.

TENDERS FOR COAL.

THE Directors of the above Company are prepared to receive TENDERS for the supply of 6000 Tons per annum of screened GAS COAL, to be delivered on the Gas-Works Siding, Midland Railway, Morecambe, in such quantities as may be required during a period of One, Two, or Three Years.

Tenders, specifying the description of Coal, the name of the Pit at which it is raised, and the terms for net monthly payments, are to be sent in on or before Friday, the 18th of March, 1898, endorsed "Tender for Coal."

The Directors do not bind themselves to accept the lowest or any Tender.

WILLIAM DUFF,
Secretary and Manager.

Market Street, Morecambe,
March 2, 1898.

CORPORATION OF LEICESTER.

TAR STILLS AND CONDENSING WORMS.

THE Gas and Electric Lighting Com- mittee of the above Corporation are prepared to receive TENDERS for the supply and erection, on Foundations provided at their Chemical Works, Aylestone Road, of six TAR STILLS, 12 ft. 6 in. by 10 ft., with CONDENSING WORMS.

Specification and Tracing can be obtained from the Engineer.

Tenders, addressed to Alderman Lennard, Chairman, and endorsed "Tender for Stills, &c.," to be delivered at these Offices not later than Eleven o'clock a.m., on Saturday, March 12, 1898.

The Committee do not bind themselves to accept the lowest or any Tender.

ALFRED COLSON, M.Inst.C.E.

Offices: Millstone Lane,
Leicester, Feb. 19, 1898.

EDINBURGH AND LEITH CORPORATIONS GAS.

THE Commissioners invite Tenders for the supply of COAL, LIME, PAINT, TIMBER, &c., required for the Edinburgh and Leith Gas-Works during the Year from Whitsunday next.

The Contractors must guarantee that, in the execution of their Contracts, they will pay the standard recognized Rate of Wages, or such Wages as are generally accepted as fair in the Trade.

Tender Forms and all Information can be had on application to the Engineer, at the Gas-Works, New Street.

Offers must be lodged not later than Ten o'clock on Monday forenoon, the 14th current, in sealed envelopes, addressed to the undersigned, and marked "Tender for Coal," or as the case may be.

The Commissioners are not to be bound to accept the lowest or any Tender.

JAMES M'G. JACK,
Clerk.

25, Waterloo Place, Edinburgh,
March 2, 1898.

MANCHESTER CORPORATION GAS-WORKS.

SPENT OXIDE.

THE Gas Committee of the Corporation of Manchester are prepared to receive TENDERS for the purchase and removal of the SPENT OXIDE to be produced at their Gaythorn, Rochdale Road, and Bradford Road Works respectively during a period of One Year from the 31st of March, 1898.

The Committee do not bind themselves to accept the highest or any Tender, and reserve the right to divide the Tenders as they may consider advisable.

Sealed Tenders, addressed to the Chairman of the Gas Committee, and endorsed "Tender for Spent Oxide," must be delivered at the Offices of the Gas Department, Town Hall, not later than Ten a.m. on Friday, the 18th inst.

Forms of Tender and further Particulars may be obtained on application in writing to Mr. Charles Nickson, Superintendent of the Department.

By order of the Gas Committee,
WM. HENRY TALBOT,
Town Clerk.

Town Hall, Manchester,
March 4, 1898.

BOROUGH OF DARWEN.

GAS-GOVERNORS.

THE Corporation are prepared to receive TENDERS for the supply of Two 20-inch GAS-GOVERNORS, with Connections and Valves complete.

Plan and Particulars may be obtained from the Engineer and Manager, Mr. A. H. Smith, Gas-Works, Darwen.

Tenders to be addressed to the undersigned, endorsed "Gas Governors," and delivered at my Office not later than Wednesday, the 16th day of March.

No Tender necessarily accepted.

By order,
CHAS. COSTEKER,
Town Clerk.

Town Clerk's Offices, Darwen.

THE Corporation of Middleton are pre- pared to receive TENDERS for the WET and DRY GAS-METERS, TUBES and FITTINGS, SULPHURIC ACID, and LIME required at their Gas-Works during the ensuing Twelve Months.

Further Particulars and Form of Tender may be obtained from Mr. T. Duxbury, Gas Manager.

Tenders, addressed to the Chairman of the Gas Committee, to be delivered at my Office on or before Wednesday, the 16th of March, 1898, endorsed "Tender for Meters" or "Tubes, &c.," as the case may be.

The Corporation do not bind themselves to accept the lowest or any Tender.

FREDERICK ENTWISTLE,
Town Clerk.

Town Hall, Middleton,
near Manchester, March 2, 1898.

BRITISH GASLIGHT COMPANY, LIMITED.

NOTICE is Hereby Given, that the HALF-YEARLY ORDINARY GENERAL MEETING of the Proprietors of this Company will be held at this Office on Wednesday, the 23rd inst., at Half-past Twelve o'clock precisely, to transact the usual Business, and to declare the Dividend for the Half Year ended the 31st of December last.

Notice is Hereby also Given, that the TRANSFER BOOKS of the Company WILL BE CLOSED on the 12th, and RE-OPENED on the 24th inst.

By order of the Court of Directors,
H. B. CHAMBERLAIN,
Secretary.

Chief Office: No. 11, George Yard,
Lombard Street, London, E.C.,
March 4, 1898.

WEST KENT GAS COMPANY.

OFFICE: 4, BRIGHTON CHAMBERS, DENMAN STREET, LONDON BRIDGE, S.E.

NOTICE is Hereby Given, that the ORDINARY GENERAL MEETING of the Shareholders of this Company, will be held at the Bridge House Hotel, London Bridge, on Monday, the 14th of March, at Three o'clock in the Afternoon precisely, for the purpose of receiving the Directors' Report, and a Statement of the Company's Accounts for the Half Year ended the 31st of December, 1897, to declare a Dividend thereon, to elect Two Directors and One Auditor, and for General Business.

The TRANSFER BOOKS WILL BE CLOSED from the 28th of February until after the Meeting.

By order of the Board,
ROBERT PEAKE KEYS,
Feb. 14, 1898. Secretary.

SALES BY AUCTION OF GAS AND WATER STOCKS AND SHARES.

MR. ALFRED RICHARDS begs to notify that his AUCTIONS of STOCKS and SHARES in London, Suburban, and Provincial Gas and Water Companies are held MONTHLY, at the Mart, Tokenhouse Yard, E.C.

He also undertakes the issuing by Auction of Gas and Water Stocks and Shares under Parliamentary Powers.

Terms for issuing such Capital, and also for including Gas and Water Stocks and Shares in these periodical Sales, can be obtained on application at Mr. Alfred Richards's Offices, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

LEA BRIDGE DISTRICT GAS COMPANY.

650 £10 SHARES

Ranking for a Standard Dividend of 7 per cent.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Wednesday, March 16, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors.

2500 SHARES IN THE

WEST HAM GAS COMPANY.

MR. ALFRED RICHARDS will Sell BY AUCTION, at the Mart, E.C., on Tuesday, March 29, at Two o'clock, in Lots, 2500 £10 (fully-paid) SHARES in the above Undertaking, to be issued under the Provisions of the West Ham Gas Act, 1889; the Dividends on these Shares rising or falling according to the Price charged for Gas. The last Dividend on the Company's £10 Shares was at the rate of 7 per cent. per annum.

Particulars of the SECRETARY of the Company, at the Offices, STRATFORD; and of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

By order of the Directors of the

HORNSEY GAS COMPANY.

£5000 FIVE PER CENT. PREFERENCE STOCK.

MR. ALFRED RICHARDS will Sell the above BY AUCTION, at the Mart, E.C., on Monday, April 4, at Two o'clock, in Lots.

Particulars of the AUCTIONEER, 18, FINSBURY CIRCUS, E.C.

In the matter of the KINGSTON-UPON-HULL GAS-LIGHT COMPANY and the KINGSTON-UPON-HULL CORPORATION ACT, 1897.

PRELIMINARY NOTICE.

NOTICE is Hereby Given, that all Per- sons having any CLAIMS against the ABOVE COMPANY are required to SEND THEIR NAMES AND ADDRESSES and the PARTICULARS OF THEIR DEBTS or CLAIMS to the undersigned Frederic Arthur Scott, the Clerk to the said Company, before the 30th day of March inst.

All Persons holding any Certificates of Shares or Certificates of Transfers of Shares in the said Company are requested to forward them to the undersigned, in order that they may be examined with the Register of the Company.

FRED. A. SCOTT,
24, Parliament Street, Hull,
Clerk to the Kingston-upon-Hull
Gaslight Company.

Hull, March 3, 1898.

NORTH MIDDLESEX GAS COMPANY.

55 £10 ORIGINAL 10 PER CENT. SHARES.
78 £10 ORDINARY 7 PER CENT. SHARES.

MAXIMUM DIVIDENDS ARE PAID.

MESSRS. EDWIN FOX AND BOUS- FIELD will include in their next Stock and Share Auction, at the Mart, to-morrow, Wednesday, March 9, at Two o'clock, the above.

Particulars at their OFFICE, 99, Gresham Street, LONDON, E.C.

COBHAM GAS COMPANY.

40 £5 SHARES (FULLY PAID).

DIVIDEND 5 PER CENT.

MESSRS. EDWIN FOX AND BOUS- FIELD will include in their next Stock and Share Auction, at the Mart, to-morrow, Wednesday, March 9, at Two o'clock, the above.

Particulars at their OFFICE, 99, Gresham Street, LONDON, E.C.

HEBBURN MAIN GAS COALS.

Yield of Gas per ton . . . . . 10,500 cub. ft.
Illuminating Power . . . . . 16·4 candles.
Coke . . . . . 68 per cent.

For Prices, f.o.b. Ship or Delivered by Rail, apply to

THE WALLSEND & HEBBURN COAL COMPANY, LTD.,
8 Lombard Street,
NEWCASTLE-ON-TYNE.

W. RICHARDSON, Fitter.

GAS PURIFICATION BY
HYDRATED OXIDE.

THIS Material is of full Strength, and Exceptional Activity. It is specially prepared to minimize Back-Pressure; and will be supplied on Hire, or Sold, on the most favourable Terms.

SPENT OXIDES containing Blue, also CRUDE FERRO-CYANIDE PRODUCTS, either PURCHASED or EXCHANGED for FRESH OXIDE.

MANCHESTER OXIDE COMPANY, LTD.,
CANAL ST., MILES PLATTING, MANCHESTER.

NEWBATTLE CANNEL.

Highest Results in Gas, & Excellent Coke.

QUOTATIONS ON APPLICATION TO

THE LOTHIAN COAL COMPANY,
LIMITED,
NEWBATTLE COLLIERIES,
DALKEITH, N.B.

Telephone: Castleford No. 214. | **Postal Address: Castleford.**
Telegrams: "Silkstone Castleford."

THE SILKSTONE & HAIGH MOOR COLLIERIES, LTD.
ALLERTON BYWATER, CASTLEFORD.

Steam, Manufacturing, & Gas Coals & Cannel.

Analysis, Contracts, Trial Waggons, and Quotations for Large and Small Orders. Inquiries Solicited.

SANDELL'S

Gas Companies' Account Books.

The Gas Companies' Expenditure Journal.

With Printed Headings and Analyzing Guide, for keeping the Expenditure of Gas Companies upon the easiest and most correct method, and in accordance with the provisions of the Gas-Works Clauses Act of 1871. Size, 16½ in. by 17½ in.

Price: Half-bound, cloth sides, two quires, 36s.; three quires, 45s.

This Book and its predecessor (on the same principle) have been in use since 1867.

The Gas Companies' Rental Book.

A companion Book to above with Printed Headings and Illustration, for keeping the Consumers' Accounts.

Size and Price as above.

The Analyzed Wages Book.

Compiled for use in conjunction with the above Expenditure Journal, with Printed Headings. Size, 15 in. by 10½ in.

Price: Half-bound, cloth sides, two quires, 15s.

Published by
SPOTTISWOODE & Co., 54, Gracechurch Street, E.C., and may also be had from CHARLES SANDELL, 3, Jeffrey's Square, St. Mary Axe, E.C.

JAMES OAKES & Co.,

ALFRETON IRON-WORKS, DERBYSHIRE,
AND
Wenlock Iron Wharf, 21 & 22, Wharf Road,
CITY ROAD, LONDON, N.,

Manufacture and keep in Stock at their Works (also large stock in London)

PIPES and CONNECTIONS, 1½ to 48 inches in diameter, and make and erect to order RETORTS, PURIFIERS and TANKS, with or without planed joints, COLUMNS, GIRDERS, SPECIAL CASTINGS, &c., required by Gas, Water, Railway, Telegraph, Chemical, Colliery, and other Companies.

NOTE.—Makers of HORSLEY'S PATENT SYPHONS. These are cast in one piece, without Chaplets; doing away with bolts, nuts and covers, and rendering leakage impossible.

BOLDON GAS COALS.

ANALYSIS.

Yield of Gas per ton . .	10,500	Cubic Feet.
Illuminating Power . .	16·9	Candles.
Coke	66·7	Coke.
Sulphur	0·86	Sulphur.
Ash	2·04	Ash.

For Prices, &c., apply to
W. H. PARKINSON,
THE HARTON COAL CO., LTD.,
NEWCASTLE-ON-TYNE.

Telegraphic Address: "PARKINSON NEWCASTLE."

INCANDESCENT GAS LIGHTING

Has now gained a complete and final Victory over its last and greatest Enemy

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BY MEANS OF
CLAY'S PATENT
SHOCK-PROOF
Incandescent Burner Fittings

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See "JOURNAL OF GAS LIGHTING," July 7, 1896, p. 19, and Dec. 21, 1897, p. 1365.

London Representatives: Messrs. Henry Greene & Sons, 153 & 155, Cannon Street, E.C.

WATERBLEAN PAINT — TELEGRAMS: "EVESON, BIRMINGHAM." — EVESON FOR CANNEL

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ALL KINDS

WRITE FOR PRICES

STAFFORDSHIRE TUBE Co., BIRMINGHAM.

HEATHCOTE GAS COAL.

Rich in Illuminating Power and Yield of Gas.
Above the Average in Weight and Quality of Coke.
Maintains a High Standard in Residuals.

THE GRASSMOOR CO., LD.

CHESTERFIELD.

PRICE'S COKE & COAL BARROW

effects a great saving of time, labour, and expense.

For Particulars, Price, &c., apply to Mr. EDWARD PRICE, 119, Queen's Road, FINSBURY PARK, N.

Prices are Reduced.

UNEQUALLED.

Gas Companies are solicited to try Samples of the

MIRFIELD
BLACK BED GAS COAL.

Prices and Analysis on application.

MIRFIELD (GAS-COAL) COLLIERY COMPY.
RAVENSTHORPE, NEAR DEWSBURY.

HOLMSIDE
GAS COALS.

Present Daily Produce over 5000 Tons.

Latest Analysis—By CHARLES PHILLIPS, Gas Examiner to Rotherham Corporation

Yield of Gas per Ton . . .	11,205 Cubic Feet.
Illuminating Power	16 7/10 Stand. Sperm. Candl.
Coke (of good & pure quality)	13¾ Cwt. per Ton.
Sulphur	A little over 1 per Cent.
Ash	Under 1 per Cent.
Tar	163 lbs. (Avoir.) per Ton.
Ammoniacal Liquor	103 lbs. (Avoir.) per Ton.

HOLMSIDE GAS COALS are supplied to the largest Gas Companies in England, and on the European Continent; London alone consuming about half the produce.

SOUTH MOOR
PELTON GAS COALS.

Present Daily Produce available 3000 Tons.

Of equal quality to the "Holmside" Coal, and also very largely used by many Gas Companies at Home and Abroad.

Both descriptions are shipped at Tyne Docks, and Dunston Staiths, River Tyne, also at North and South Docks, Sunderland.

These Coals may be bought through the Principal Merchants in England, or direct from

MR. MARK ARCHER,
HOLMSIDE & SOUTH MOOR OFFICES,
NEWCASTLE-UPON-TYNE.

ALEXANDER CAMERON,
GAS AND CANNEL COAL MERCHANT,
48, WEST REGENT STREET,
GLASGOW.

LONDONDERRY GAS COALS

FROM THE
MARQUIS OF LONDONDERRY'S COLLIERIES,
COUNTY OF DURHAM.

Available output up to 5000 tons per day.
Yield of Gas 11,000 cubic feet per ton of Coal as per analysis by Mr. John Pattinson, F.C.S., F.I.S.

FOR PRICES AND PARTICULARS, APPLY TO
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SEAHAM HARBOUR, COUNTY OF DURHAM.

THOMAS TURTON AND SONS, LIMITED,

SHEAF WORKS, SHEFFIELD,
MANUFACTURERS OF
FILES OF BEST QUALITY
FOR ENGINEERS.
STEEL OF ALL DESCRIPTIONS.

SCREW STOCKS, TAPS AND DIES,
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ANVILS, VICES,
AND ENGINEERS' TOOLS GENERALLY.

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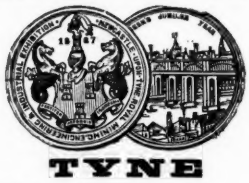
Awarded HIGHEST MEDAL and DIPLOMA at the Newcastle-on-Tyne Royal Mining and Industrial Exhibition, 1887,
for
CANNEL & COAL.



TYNE
BOGHEAD CANNEL.

Yield of Gas per ton	13,155 cub. ft
Illuminating Power	38·22 candles.
Coke per ton	1,301·88 lbs.

EAST PONTOP GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	17·8 candles.
Coke	70 per cent.

SOUTH PELAW MAIN GAS COAL.

Yield of Gas per ton	10,500 cub. ft.
Illuminating Power	16·3 candles.
Coke	73·1 per cent.

For Prices and complete Analysis, apply to
THOS. W. DANCE & SONS,
COAL OWNERS, NEWCASTLE-ON-TYNE;
OR
E. FOSTER & CO.,
21, JOHN STREET, ADELPHI, LONDON, W.C.

TROTTER, HAINES, & CORBETT,

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FIRE-CLAY & BRICK WORKS,

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Manufacturers of GAS-RETORTS, GLASSHOUSE FURNACE & BLAST-FURNACE BRICKS, LUMPS, TILES, and every description of FIRE-BRICKS.

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Shipments Promptly and Carefully Executed.

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THORNLEY GAS COALS

WORKED BY THE

WEARDALE IRON & COAL Co., Ld.

OUT OF THEIR

THORNLEY AND WHEATLEY HILL COLLIERIES.

Analysis made by

Messrs. J. & H. S. PATTINSON, *May 98, 1895.*

Yield of Gas per Ton	10,500 Cub. Ft.
Illuminating Power	16·9 Candles.
Coke (of good quality)	67·5 per Cent.
Sulphur	0·58 „
Ash	2·73 „

For Price, &c., apply to the

WEARDALE IRON & COAL Co., Ld.

QUAYSIDE, NEWCASTLE-ON-TYNE.

THE SILICA FIRE-BRICK COMPANY,

OUGHTIBRIDGE, near SHEFFIELD,

MANUFACTURE

SILICA BLOCKS, BRICKS, AND CEMENT

OF SUPERIOR QUALITY

FOR GAS-FURNACES.

Trade Mark: "SILICA."

These Goods (largely used in Gas, Glass, Iron, and Steel Works) are, on account of their

GREATER DURABILITY,

Strongly recommended where EXCESSIVE HEATS have to be maintained.

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Supply to any Railway Station, or for Export, all kinds of Fuel for Gas purposes.

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WORTLEY FIRE-CLAY WORKS,

Near LEEDS,

Have confidence in drawing the special attention of GAS ENGINEERS to the following advantages of their Retorts:—

1. Smooth interior, preventing adhesion of Carbon.
2. They can be made in one piece up to 10 feet long.
3. Uniformity in thickness, ensuring equal Expansion and Contraction.

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MACHINE-MADE GAS-RETORTS.

H. KIRKHAM & CO.

Are now prepared to Tender for **SCRUBBER-WASHERS** fitted with their Patent Basket or Cage, with Improved Washing Surface. It is acknowledged to be the **MOST EFFECTIVE MACHINE** for extracting Ammonia and other Impurities from Coal Gas. It is guaranteed to Purify 20 per cent. more Gas in the same space, and at considerably less cost per Machine. The Baskets and Scrubbing Surface can be readily applied to all the sizes of the Kirkham, Hulett, and Chandler Machines now in use.

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FIRE-BRICKS of the highest Quality, made from Fire-Clay of a most Superior and Refractory Character, suitable for **GLASS-WORKS, GAS-WORKS, and BLAST-FURNACES.**

WHITE GLAZED AND SALT GLAZED BRICKS, BUFF FACING BRICKS, &c.

For Prices and Analysis, apply as above.

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Manufacture & supply best quality of

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Special Bricks & Blocks for GENERATOR & REGENERATOR FURNACES.

FIRE BRICKS, LUMPS, & TILES; BLUE STAFFORDSHIRE VITRIFIED BRICKS FOR PAVING, &c. &c.

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GASHOLDER TANKS { BRICK AND PUDDLE, OR CEMENT RENDERED. STEEL or WROUGHT-IRON. ALL SIZES.

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COMPLETE OR PARTIAL ERECTION OF GAS,

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FOR

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OF EVERY DESCRIPTION,

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The latter being the Highest Award for Dry Gas-Meters at the Paris Exhibition, 1867. Since then we have not Exhibited FOR PRIZES.

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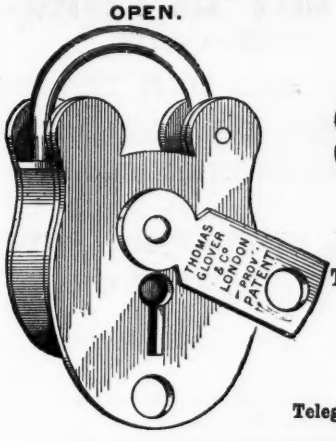

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Prevents Tampering with the

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The Padlock is Sealed by means of a Lead Eyelet, which is impressed with Company's private mark. Eyelets easily fixed and removed by Company's Collector.

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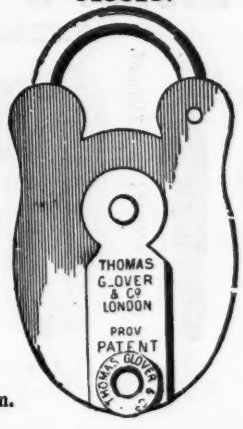

Telegraphic Address: "GOTHIC LONDON." Telephone No. 725, Holborn.

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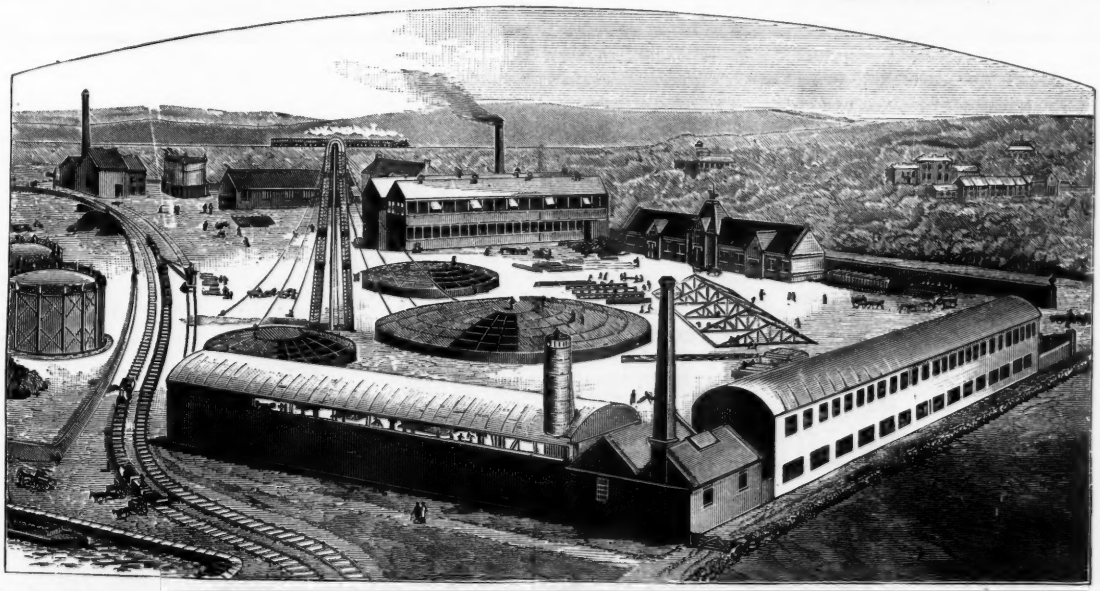
OFFICES: EXETER. WORKS: 248, Kingsland Road, LONDON; James St., and St. Thomas, EXETER.



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GLAZED BRICKS AND PORCELAIN BATHS.

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THESE SETTINGS SECURE THE RECORD PRODUCTION OF

1000 CUBIC FEET OF GAS PER LINEAL FOOT OF RETORT (Ordinary Section) per 24 HOURS from ENGLISH COAL, and

1200 CUBIC FEET FROM SCOTCH COAL,

Together with every other possible Advantage.

DURABILITY AND SIMPLICITY OF MANAGEMENT. LOWEST POSSIBLE FUEL ACCOUNT. PERFECT SATISFACTION GUARANTEED.

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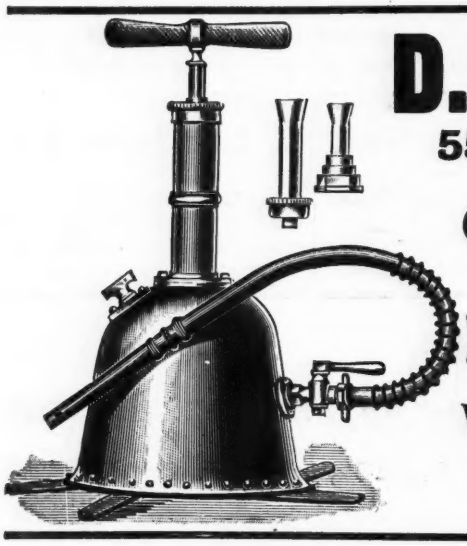
R. F. HISLOP, Gas Engineer, CRAIGIELEA, PAISLEY.



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RETORT BENCHES ERECTED COMPLETE WITH OR WITHOUT SPECIAL FURNACES. RESULTS GUARANTEED.

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ANALYSIS: 11,390 feet of 17-Candle Gas. Value in Sperm per ton, 686 lbs.

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Great Saving in Cost, and Absolutely Reliable in Working.

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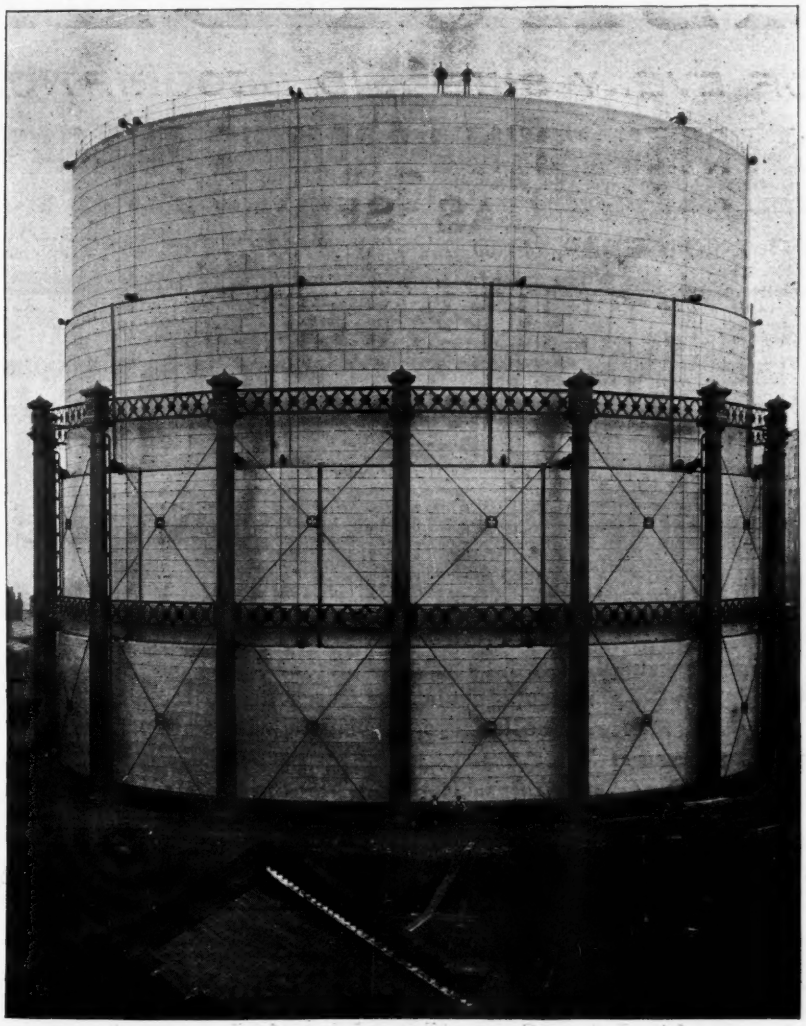

THESE HOLDERS ARE CERTIFIED BY USERS TO BE STEADIER UNDER WIND PRESSURE THAN HOLDERS WITH COLUMNS.

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Enlarged under Patent 41,189, 1897, with Water in the Tank, for STOCKPORT CORPORATION.

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CARBURETTED WATER-GAS PLANT.

ADOPTED AT

HORNSEY.	BUENOS AYRES.	FOLKESTONE.	
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GASHOLDERS

OF EVERY SIZE AND DESCRIPTION.

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HAS BEEN ADOPTED FOR MANY IMPORTANT HOLDERS.

IT IS STRONG AND CHEAP, AND REQUIRES NO PIERS FOR ITS SUPPORT.

THE

MAXIM PATENT CARBURETTOR

FOR ENRICHING GAS IN BULK.

OVER 60 MAXIM PATENT CARBURETTORS HAVE NOW BEEN FIXED.

Among the Companies supplied are The Gas Light and Coke Company, The South Metropolitan Gas Company, Birmingham Corporation, Manchester Corporation, Rochdale Corporation, Bristol Gas Company, and many other Works, both large and small, where they have been working in some instances for the past **Seven Years.**

MORE GAS & SALEABLE COKE PER TON of COAL CARBONIZED is PRODUCED; SAVING CAPITAL, LABOUR, FUEL, WEAR & TEAR, &c.

THE ENRICHMENT IS INSTANTANEOUS AND PERMANENT.

The Carburettor is inexpensive, easily fixed, and entirely supersedes the use of Cannel.

SOLE AGENTS FOR REDWOOD & CLOWES' INFLAMMABLE VAPOUR & GAS DETECTORS.

Dealers in Carburine and all other Naphthas and Oils suitable for the Enrichment of Gas.

For Prices and full Particulars, apply to

THE GAS LIGHTING IMPROVEMENT COMPANY, LIMITED,

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THE

DENAYROUZE LIGHT SYNDICATE, LTD.,

BEG to announce that, having made arrangements for the Manufacture of their **BURNERS** in England, they are **NOW ABLE TO SUPPLY THESE IN ANY QUANTITY.**

These Burners (with Mantles specially made for the Syndicate by the Incandescent Gas-Light Company, Ltd., under the Welsbach Patents) are admitted by all Experts to be the **BEST AND MOST ECONOMICAL LIGHTS FOR LARGE AREAS AND PUBLIC STREETS.**

NO CHIMNEYS REQUIRED.

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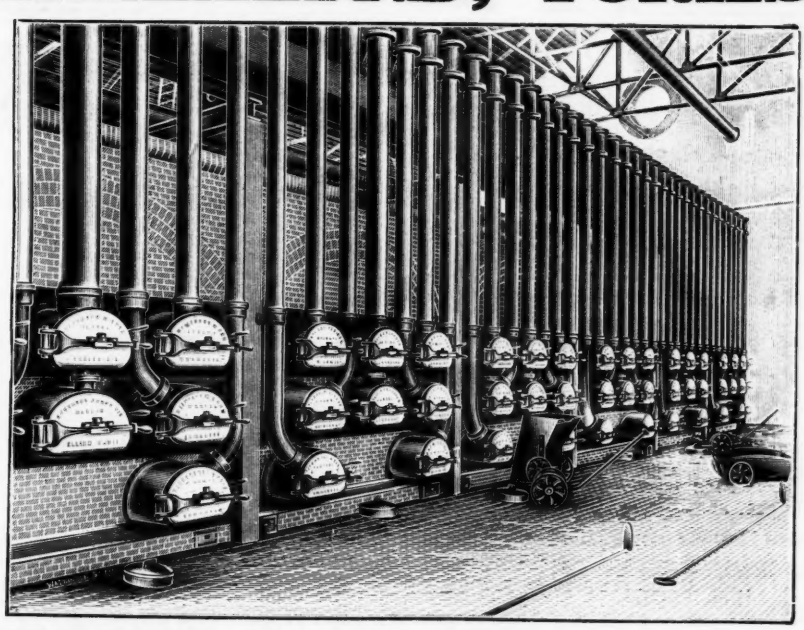

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MANUFACTURERS OF
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Established 1860.

PETTIGREW'S PATENT
Sulphate of Ammonia Plant
ON THE CONTINUOUS SYSTEM
Is the newest in the Market, and is the outcome of practical experience in Sulphate Making.
Old Systems easily and cheaply converted.
ANY SIZE ERECTED COMPLETE AT HOME OR ABROAD.
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THE
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A 280-Candle Power PLAIN IRON LAMP,
CLASS A— 55/-
LIGHT for LIGHT
less than half the price of any other Regenerative Lamp.
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PARTICULARS AND PRICES FREE. AGENTS WANTED.

PATENT TWISTED TAPER
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These **Patent Twisted Taper Rymers and Taps** are the best ever made for Gas and Water Service Connections. A true Hole and a correct Thread can be assured. They are easy to work, and will last much longer than straight grooved Taps and Rymers.

THOUSANDS ARE IN DAILY USE.

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Patent Automatic Machinery
FOR
DRAWING AND CHARGING GAS-RETORTS.

Full Particulars may be obtained from the Sole Makers,
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[See Illustrated Advertisement, March 1, p. 449.]

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MAKERS OF THE **BIRMINGHAM.**

PATENT "SURPRISE" PENDANT,
WITH PATENT SHADE.

The ONLY GAS-PENDANT suitable for Domestic Lighting; a room 18 ft. by 14 ft. being beautifully illuminated with one Incandescent Burner.

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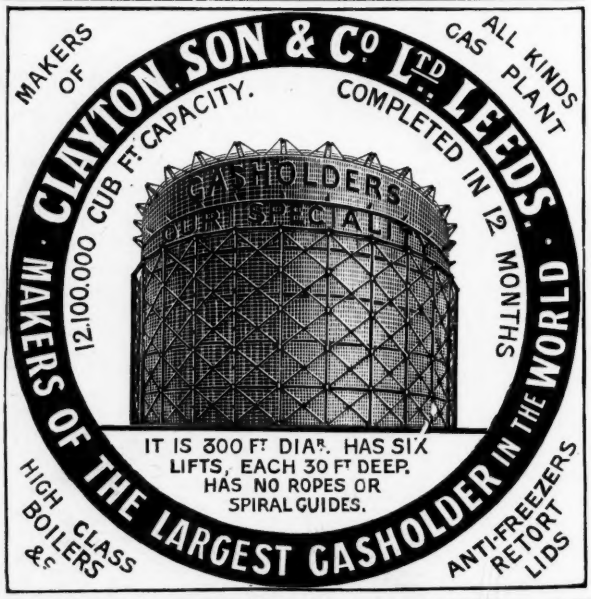
it quite **supersedes** the familar three-light pendent. We are able to bear witness to the **convenience** of the New Pendant."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CLAYTON, SON & Co. LTD. LEEDS.
ALL KINDS GAS PLANT
12,100,000 CUB FT CAPACITY.
COMPLETED IN 12 MONTHS
GASHOLDERS
OUR SPECIALITY
IT IS 300 FT DIAS. HAS SIX LIFTS, EACH 30 FT DEEP. HAS NO ROPES OR SPIRAL GUIDES.
MAKERS OF THE LARGEST GASHOLDER IN THE WORLD
HIGH CLASS BOILERS &c
ANTI-FREEZERS RETORT LIDS

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Proprietors of Best Glasshouse Pot, Crucible, and other Stourbridge Clays.
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Have been made in large quantities for the last twelve years; and during the whole of that time, have been in regular use at most of the largest Gas-Works in the Kingdom. They possess the excellent quality of remaining as near stationary as possible under the varying conditions of their work—a quality which will be appreciated by all Gas Engineers and Managers. The generally expressed opinion is that these Retorts are the very best that are made.

RETORTS CAREFULLY PACKED FOR EXPORT.
Fire-Bricks, Lumps, Tiles, &c., &c., of every description suitable for Gas-Works.

GODDARD, MASSEY, & WARNER'S
IMPROVED
Sulphate of Ammonia Apparatus.

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[See also Advt. p. 520.

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